Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Vol. 10 No. 5 May 1957

Fish and Wildlife Service
U.S. Department of the Interior
Washington D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR

FRED A. SEATON, Secretary

FISH AND WILDLIFE SERVICE

JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

EDITORS

A. W. ANDERSON, Chief, Branch of Commercial Fisheries

DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR

MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITORS

KATHRYN L. OSTERHAUG, Fishery Products Technologist, Seattle

F. BRUCE SANFORD, Chemist, Seattle

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.5 TECHNICAL NOTE NO. 34 --GROWTH CHARACTERISTICS OF THE PINK YEAST THAT CAUSES DISCOLORATION OF OYSTERS

McCormack, Grace (Veterans Administration Hospital, Canandaigua, New York)
Commercial Fisheries Review 18, 21-23 (November 1956)

Top grade oysters that are apparently free of any defect when packaged may develop pink spots during frozen storage. The drip from these oysters after thawing has a pink color. A study was made to determine the cause of this phenomenon. The literature indicates that the agent causing the pink discoloration may be an asporogenous yeast belonging to the genus Torulaceae. The work reported here indicates, however, that the pink yeast may produce ascospores.

Experimental. -- A representative sample of pink spotted oysters was thawed and homogenized in a blender. The homogenate was used to inoculate tubes of Sabouraud's broth media. The growth that developed in the broth tubes was then used to streak Sabouraud's agar plates to which lactic acid had been added. After 3 to 4 days of incubation at room temperature, pink colonies appeared on the plates.

These colonies were confluent, shiny, butyrous, and pink; a few were discrete. Upon examination under oil immersion, stained smears were revealed as yeast cells, some of which were budding.

After four years of dormancy on tightly sealed Sabouraud's agar slants in large test tubes, the culture was found to contain asci, each of which had from one to four ascospores. These dormant cultures were found to grow satisfactorily; their colonies had normal contours; the cells budded normally, and no spores were present.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.00 DETERIORATION OF COOKED SOUTHERN OYSTERS

Gardner, Elizabeth Ann and Watts, Betty M. (Florida State University, Tallahassee)
Food Technology 11, 6-11 (January 1957)

Due to the destruction of enzymes and bacteria by heat, it is to be expected that the spoilage of cooked oysters will differ from that of raw oysters.

Raw Southern oysters were found to give an exceptionally strong qualitative test for the enzyme catalase with 3 percent hydrogen peroxide. This test was used to indicate inactivation of this enzyme by heat treatment.

Spoilage, which took place in oysters cooked enough to inactivate catalase and subsequently frozen or refrigerated, appeared to be of an oxidative type characterized by a "rancid fish" odor. By adding various antioxidants to the cooking water, this type of spoilage was retarded.

Weight losses during cooking were influenced more by length of cooking time than by cooking method. Further losses of liquid took place upon refrigerated storage of the cooked oysters. Total weight losses ranged from 17 percent to 59 percent in oysters which were cooked and subsequently stored at 41° F. (5° C.), whereas losses in uncooked oysters held under the same conditions of storage were from 10 percent to 12 percent.

The addition of a polyphosphate at 0.1 percent and 0.5 percent levels in the cooking water had no effect on fluid losses during cooking or subsequent storage.

See table, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

1.92 DEVELOPMENT OF MARKETS FOR UNDERUTILIZED LAKE ERIE FISH, PROGRESS REPORT

Premetz, Ernie D. (U. S. Fish and Wildlife Service, Sheffield Lake, Lorain, Ohio)
Commercial Fisheries Review 18, 1-7 (November 1956)

A preliminary study of the Lake Erie area indicated that there are large populations of rough fish that play only a minor role in the commercial catch because of economic selectivity. These consist of gizzard shad (sawbellies), goldfish, sheepshead, carp, burbot, and white bass.

A survey was made recently to determine the potential availability of the various species of rough fish in Lake Erie. The Ohio Commercial Fishermen's Association distributed questionaires among its members asking that they indicate the quantity of each species of rough fish they felt they could produce incidental to their marketable fish during each month of the fishing season.

The results of this survey are given in table 1 (see over).

Assuming that the fishermen could produce about 25 million pounds of rough fish per year, a number of problems, in addition to that of marketing them, would have to be overcome before they could be utilized. Chief among these is the lack of freezer space in the Lake Erie area. Another problem is the high cost of trained labor which would make it uneconomical for most producers to handle fish that normally command a low price. A third serious problem is the low price offered for rough fish by the processors of food for animals.

Many possible markets for Lake Erie rough fish have been explored. Included among these are the: (1) human food industry, (2) fur farm industry, (3) pet food industry, (4) fish meal industry, and

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 ABSTRACTER: Kathryn L. Osterhaug

2.14 DETECTION OF FISH - ECHO SOUNDING

Cushing, D. H. and Richardson, I. D.
Fishery Investigations 1955, 20, Series 2, No. 1 (1955) (London, England)
World Fisheries Abstracts 7, 21-22 (September-October 1956)

Describes investigations carried out with a triple frequency echo sounder for detection of fish. The contents are as follows: introduction; method; treatment of results; results: cod (Bear Island), herring (Sandette), herring (Northumberland), unidentified trace at Ruytingen, unidentified trace at Start Point; discussion; bibliog.

Earlier investigations had indicated that the signals returned by cod and herring were different for different frequencies, a lower frequency being best for cod and a higher frequency best for herring. Three oscillators of 10, 14 and 30 kc./s. were used as transceivers and were mounted alongside each other in a wooden fairing. Three recorders placed alongside each other were driven by a single motor.

The results indicate that there are significant differences between signal strengths of different frequencies received from the same shoal of fish. From artificial shoals of dead fish, stronger signals were received with herring on 30 kc./s. than on 10 kc./s.; with cod, stronger signals were received at 10 kc./s. Small scale experiments on cod at Bear Island showed that 10 kc./s. were more effective than 14 kc./s. and on herring at Calais, 30 kc./s. were more effective than 10 kc./s. Stronger signals from cod of 54 cm. (21 3/16 in.) were received at 14 kc./s. and not at 10 kc./s. The size of cod also may have an influence on the signal strength of a particular frequency.

There are great differences in frequency ratios (signal strength with 10 kc./s. values taken as unity) for different fish (see table over) but the frequency ratios for the same fish sp. seem to be the

(over)

 ABSTRACTER: G.N. Subba Rao

PINK YEAST FROM OYSTERS

MARKETS FOR ROUGH FISH

SPOILAGE IN OYSTERS

ECHO SOUNDERS

1.92 (Cross Reference: 6.5)

(5) fish hatchery food market. Of these, the potential appears to be greatest in the fur farm and pet food industries at the present time.

To further facilitate the development of markets for Lake Erie fish a program of research is recommended that includes the following:

(1) Proximate composition and thiaminase assays of all rough fish species should be determined, by area, at prescribed intervals throughout the fishing season.

(2) Fur animal nutritional studies, using lake species, should be conducted, if possible. These would have to extend through several generations to be effective.

(3) A continuing survey of all potential markets for rough fish.

Table 1 - Potential Rough Fish Production by Members of the Ohio Commercial Fishermen's 1/ Association

Month	Sheepshead	Burbot	Carp	Gizzard Shad	Total
	(Thousands of Pounds)				
March	130.0	11.2	310.9	185.6	637.7
April	2,708.0	42.0	940.4	594.0	4,284.4
May	5,712.4	139.2	506.4	1,419.2	7,777.2
June	4,948.2	76.0	640.3	1,724.8	7,389.3
July	761.4	4.4	255.0	1,044.8	2,065.6
August	285.2	4.8	305.4	450.8	1,046.2
September	371.2	9.4	106.8	449.6	937.0
October	277.2	15.2	184.5	507.2	984.1
November	237.2	35.2	141.9	161.6	575.9
December	44.5	18.0	6.4	82.8	151.7
Total	15,475.3	355.4	3,398.0	6,620.4	25,849.1
Actual Landings, 1955	1,575.5	89.3	2,406.9	0	4,071.7

1/ These are estimates from only part of the fishermen. The actual potential is considerably greater.

0.5 (Cross Reference: 1.81)

Previous work had demonstrated that pink yeast will grow and form pigment at temperatures down to -35°F. The fact that pink yeast produces spores suggests that the avenues of contamination are probably much more numerous than was formerly believed when only the vegetative form of the organism was studied by itself. There appears to be great need for further research on the causes of pink and red discoloration in shucked oysters.

2.14

same. The coefficients of variation, however, do not remain the same and are probably a function of the behavior of fish. Significant differences in the coefficients of variation in the case of herring shoals indicate the differences in the packing of the shoals with fish.

The results of observations with a triple frequency echo sounder suggest that it might be possible with its use to find the sizes of fish in a given echo trace thereby leading to a physical method of fish identification.

Frequency Ratios (with 10 kc./s. values taken as unity) and Mean Coefficients of Variation for a Number of Fish Traces

Fish	10 kc./s.	14 kc./s.	30 kc./s.
Cod (54 cm. or 21 3/16 in.)			
Frequency ratio	1.0	5.4	0.6
Coefficient of variation	40%	40%	62%
Herring (Sandette)			
Frequency ratio	1.0	2.9	9.2
Coefficient of variation	10%	21%	11%
Herring (Northumberland)			
Frequency ratio	1.0	2.7	7.0
Coefficient of variation	c. 75%	c. 75%	c. 75%
Unidentified (Ruytingen)			
Frequency ratio	1.0	10.0	4.5
Coefficient of variation	25%	32%	10%

2.00

Table 4

Acceptance of cooked oyster odors by a panel of sixteen judges rating the odors on a scale from 1 to 10, with 10 representing the most acceptable.

Description of oyster	Number of judges ascribing rating										Mean rating	Standard deviation	Standard error
	0	1	2	3	4	5	6	7	8	9	10			
Cooked with 0.025 BHA-NDGA mixture and frozen for eight months.		1		2	1	1		2	5	2	2	6.75	2.63	.66
Cooked with H_2O only and frozen for eight months.		2	3	1	2	3	2		1	1	1	4.69	2.75	.69
Fresh samples cooked with H_2O only,			3	2	3	3			2	1	2	5.25	2.74	.69
Cooked with 0.05% smoke and frozen for eight months	1	1		2	1		3	1	2	2	3	6.25	3.13	.78

$X^2 = 17.30$. Degrees of freedom = 30. P = 0.97.

This report covers work performed under contract with the Fish and Wildlife Service.

2.1121 CONSTRUCTION AND USE OF PRAWN TRAWL TRY-NET

Robas, John S. (Fernandina Beach, Florida)
Fisheries Newsletter (Australia) 15, 5, 7, 9, 11 (November 1956)

The try-net, as its name implies, is designed to test out a prawning ground before putting the big trawl overboard. Several try-net drags are made by a prudent captain to satisfy himself that prawns are present in profitable quantity and that excess fish are not present. Towing a trawl through a school of small fish will plug the net solidly with small fish and endanger the gear. In any event, the tow is lost.

After the big trawl is overboard, the use of the try-net continues. As the main trawl is towed along, the try-net is periodically dropped overboard to check the catch during the fishing operation.

A try-net, to be useful, must be small, light, and easily handled. The sequence of events in streaming a try-net is as follows:

The try-net and its attached otter doors is hanging from a small pipe davit on the port quarter of the vessel. The davit is built of 2½-inch galvanized steel pipe and stands about 4 ft. high, measured from the deck, with a reach overboard of about 2 ft. The Captain flips the net into the water, walks forward to his winch and releases the brake on the top drum, allowing otter doors and net to drop. He pays out a generous amount of cable, sets the brake on the winch and allows the net to tow for three to twenty minutes, depending upon the area and his past experience. He then puts power on his winch, engages the clutch in the top drum and hauls his try-net back. Since he has fingertip control of the winch drum, he runs the otter doors right up to the davit, sets the brake and takes power off the winch. Walking aft, he flips the cod-end of the net on deck and shakes out the catch of prawns, fish, crabs

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 ABSTRACTER: Kathryn L. Osterhaug

2.12 UNDERWATER TELEVISION VEHICLE FOR USE IN FISHERIES RESEARCH

Sand, R. F. and McNeely, R. L. (U. S. Fish and Wildlife Service, Coral Gables, Florida)
Special Scientific Report: Fisheries No. 193, pp. 1-15 (December 1956) (United States Department of the Interior, Fish and Wildlife Service, Washington, D. C.)

To fulfill a need for better direct visual undersea observations, especially in the field of fisheries gear research, a prototype remotely controlled underwater television vehicle was fabricated. Previous successful experiments with underwater television disclosed the advantages of a design that would allow operation with existing industrial television equipment. Also, some of the basic considerations were (1) ease in handling, (2) maneuverability, and (3) a useful working range down to 50 fathoms, together with both horizontal and vertical scanning mechanisms for the camera. Important too was the ability of the unit to hover, to be placed on the bottom for extended periods of time, or to be moved through the water at speeds up to 3 knots. Practical considerations of time and available funds limited the selection of certain mechanical and electrical devices and materials used in the fabrication and, while not offered in any way as a final or ultimate design, the resulting relatively uncomplicated combination of pressure vessels, mechanical devices and circuitry performed quite well.

The upper double pressure chamber was constructed of standard 20 by 3/8 by 10-inch length and standard 10 by 5/16 by 10-inch length mild steel pipe. These pipes were closed at either end by plates and flanges to form a watertight compartment housing the control mechanism. To the lower flange of this arrangement 31-inch tripod legs were mounted for use of the vehicle in bottom observations; during towing these legs could be removed.

The lower watertight chamber, which contained the camera, was made from standard 8-inch steel

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 ABSTRACTER: Harold C. Johnson

2.1124 NEWFOUNDLAND COD TRAP IN FISHING ORDER

Anonymous
Trade News 9, 6 (December 1956)

The box-like cod trap pictured on the back of this card, which was developed some 90 years ago by a Newfoundland fisherman, annually accounts for a large proportion of the landings of cod by Newfoundland fishermen, particularly on the east coast.

All of the cod traps are of the same basic construction but vary widely in size. They vary from 35 fathoms on the round to extra large traps of 84 fathoms.

The traps are set out in the inshore waters with the leader end moored close to the shore or to a reef. Cod swimming by are diverted into the door of the trap. Once inside, the cod are free to leave by the doorway, but are discouraged from doing so by the "lay" of the front walls which slant inwards to the doorways. In setting out the cod trap, the fishermen first place the framework of ropes with the anchors and buoys in position and attach the mesh sides and floors afterwards. In hauling them, the mesh is pulled in so that the fish are "dried up" at the back of the trap or in one of the back corners, depending upon the state of the tide.

In spite of the development of more mechanized methods of fishing, the cod trap continues to be a prolific producer during the summer season.

Cost of traps vary according to size, where they are made, and construction features. A typical 60-fathom trap ranges from about $1,400 to $1,800, and one around 84 fathoms may cost as much as $3,000.

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 ABSTRACTER: Kathryn L. Osterhaug

3.0 MEAT, FISH AND F.I.O.

Anonymous
Report of the Food Investigation Board (Great Britain) for 1955, pp. 30-41 (1956)
Food Manufacture 31, 383-384 (September 1956)

Smoke curing. --Studies on smoke-cured white fish and herring have included investigations on the physical properties of wood smoke and on the physical aspects of its deposition on fish. It has been observed that the vapor phase contributes significantly to the uptake of smoke constituents on wet surfaces. The new electrostatic method of smoking fish, based on the dispersion and the deposition on fish of electrically charged smoke particles in a field-free space has been successfully applied in a 40-stone Torry type kiln. Kippers produced by this method are claimed to be as good as those smoked by the normal method.

Smoke production. -- There has been further development of the "fluidiser" mentioned last year, in which sawdust is maintained as a fluidised bed by a stream of heated air, and the temperature is controlled to produce destructive distillation rather than combustion. It has been established that kippers may be satisfactorily smoked with only about one-third of the normal quantity of sawdust. The shape of the fluidisation chamber is of critical importance and a patent is being sought for the best design, a truncated cone of small angle. When the sawdust is decomposed in the fluidised bed, the final charred particles are less dense than the original sawdust and are hence carried upwards in the gas stream. Advantage has been taken of this to convert the apparatus from "batchwise" to continuous operation. Fresh sawdust is fed in by a worm feeder and the decomposed material carried out with the smoke, from which it is separated by a cyclone.

Drying. -- Experiments have been made on the diffusion of water in fish flesh and in starch; the

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 Reprinted in part

PRAWN TRY-NET

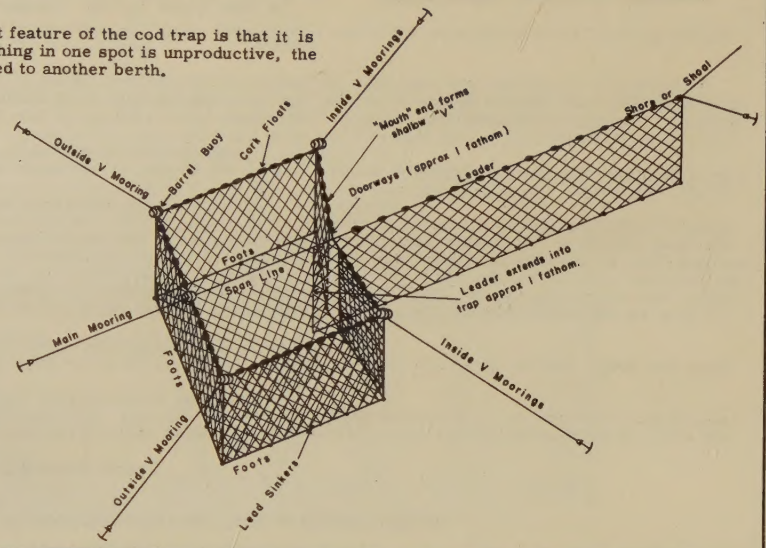
COD TRAP OPERATION

UNDERWATER TELEVISION

BRITISH FISHERY RESEARCH (1955)

2.1124

An important feature of the cod trap is that it is moveable. If fishing in one spot is unproductive, the trap can be shifted to another berth.



Newfoundland Cod Trap In Fishing Order

3.0

latter being made to elucidate the fundamental mechanisms of water migration which affect the process of dehydration. A small plant for vacuum freeze-drying fish in sufficiently large quantities to enable tasting and storage tests to be carried out systematically has been constructed and will shortly be in operation. Vacuum freeze-drying results in a product closest to the original fish when reconstituted. The effect of protein denaturation on the texture of dehydrated fish was also studied. The addition of denaturation inhibitors to the flesh might result in improved dehydrated products by decreasing the tendency of the protein to form cross-links. However, attempts to apply the findings to blocks of fish flesh have as yet been unsuccessful, although when the salt content of air-dried minces was adjusted to about 0.05 to 0.1 molar, there was a slight improvement in softness and reconstitution.

Fish byproducts. --It is often necessary to preserve herring before processing them for meal and oil. Preservation experiments have been carried out at temperatures in the range 12.8° -18.3° C., by dipping the fish in mixtures of formaldehyde and sodium nitrite.

Bacteriology and biochemistry. -- Marine bacteria are the main agents in the spoilage of fish, but marine bacteriology is still a largely unexplored field. Systematic basic studies have therefore continued, particularly on the flora of skate and lemon sole and of cod and the effects on it of handling, and of the flora of spoiling iced fish. A bacteriophage has been isolated from sea water, and investigations have been made on the taxonomy of luminous bacteria, the development of differential culture media, and the bacteriological quality of ice and its influence on the spoilage of chilled fish. Examinations of the nature and condition of the constituent proteins of fish muscle are continuing and additional information about differentiation of species of fish by the electrophoretic analysis of extracts of the more soluble muscle proteins has been gathered. Lipids, partly in the form of lipo-proteins, are believed to affect the quality of fish after processing and work has continued on the synthesis and properties of various phospholipids. Other biochemical investigations have been on fat oxidation, the metabolic products of marine microorganisms and on phenolic compounds of biological importance.

2.1121

and shell. From the number and size of the prawns taken on this tow he estimates the fishing being done by his large trawl. If a 3-drum winch is not available, a 2-inch circumference manila rope will be ample to handle the try-net and the gear can be hauled with any convenient gypsy spool.

Construction of Prawn Trawl Try-Net -- No. 1.

Illustration 1. Showing cutting plan for top

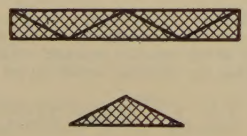


Illustration 2. Cutting the corner pieces.

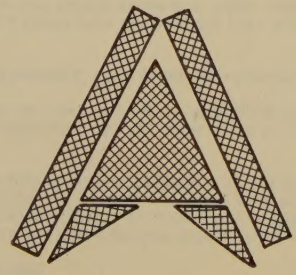


Illustration 3. Showing general arrangement

2.12

pipe 18 inches long. It was fitted in a cradle supported by a framework constructed to insure proper shaft drive for the slide arrangement and housing support. To provide a minimum of turbulence and to equalize drag effects at all camera housing attitudes while under tow, a free flooded ball bearing fairing was added to the camera housing.

The heart of the vehicle was the Vidicon industrial television equipment. Basically the unit consisted of a portable monitor control unit mounting a 10-inch viewing screen, a small camera, and 50 to 500 feet of multi-conductor cable. A reliable and stable source of 110 volt AC 60 cycle power was important and was supplied by a 3 kilowatt generator used with a motor generator set and voltage regulator. A separate source of 24 volts DC power was used for the scanning drive unit.

The underwater television vehicle permits good observations from close-ups to distances of 60 to 70 feet under favorable conditions. Whether placed on the sea-bed, suspended, or under tow, the power control assembly allows scanning of 360° in azimuth and 90° in elevation. The diffused light underwater causes little or no shadow; however, while the camera is in motion some impression of stereopsis may be present. In water conditions where natural light levels are too low for the human eye, the extra sensitivity of a television camera is often able to achieve higher resolution by the ability to integrate light. With the use of underwater lighting, the television camera's useful depth range can be extended when water conditions permit.

2.19 OBJECTIVE TESTS APPLICABLE TO QUALITY STUDIES OF ICE STORED SHRIMP

Bailey, M. E.; Fieger, E. A.; Novak, A. F. (Louisiana State University, Baton Rouge)
Food Research 21, 611-620 (November-December 1956)

Purpose. --A study was made to demonstrate the effectiveness of various tests for evaluating the organoleptic quality of iced shrimp. These tests can be classified into: (1) those that indicate definite changes in prime quality such as glycogen-sugar content, lactic acid, and acid-soluble orthophosphate; (2) those that signify onset of spoilage such as trimethylamine nitrogen, volatile acids, bacterial plate counts, and sulfhydryl groups; and (3) those that determine relative quality but do not signify onset of spoilage or indicate definite changes in prime quality such as hydrogen ion concentration, amino nitrogen, hydration of water-insoluble protein, and sulfhydryl groups (ferricyanide reduction).

Experimental. --The procedures for procuring, handling, and storing shrimp were those outlined in a proposed publication of Fieger, Bailey, and Novak. Headless, shelled, shrimp tissue was cut into small pieces and 25 to 50 grams of the cut pieces were extracted in a Waring blendor with the solvent most appropriate for the test to be made. Headless shrimp with shell intact were used for making bacterial counts.

For the determination of the degree of hydration of water-insoluble protein, a definite quantity of shelled shrimp (0.1 gram per milliliter (ml.) of water) was homogenized in a Waring blendor. Fifty ml. of this homogenate was quickly transferred to a graduated centrifuge tube and centrifuged for 5 minutes at 1800 r.p.m. in a number II International centrifuge. The volume of insoluble precipitate was read immediately, and the water soluble fraction was poured from the centrifuge tube. After the insoluble fraction had been allowed to drain for 2 minutes, 0.5 grams of it was examined gravimetrically for water. A glass electrode was used to determine the hydrogen ion concentration of the

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 ABSTRACTER: Martin Heerdt

2.3 FILLETING UNIT

Anonymous
Food Manufacture 31, 526 (December 1, 1956)

A machine builder in Northern Germany has recently introduced a white fish filleting machine for filleting small haddock, cod, and fish with similar bone structure. Fish for filleting must range in size from 12 inches to just under 24 inches in length. A picture of the filleting machine is shown (see over).

Construction. --The filleting machine consists of one combination heading, filleting, and nape cutting unit and two fillet skinning units as shown (see over).

Operation. --When in use, the machine requires one employee to feed fish into the filleting unit, one employee to feed fillets into each of the two fillet skinning units, and one employee to trim the skinned fillets if necessary, or a total of four employees. Each fish as it enters the filleting unit is measured automatically, deheaded, filleted, and the fillet trimmed along the belly flap or nape all in one closed operating cycle. Gutted as well as ungutted fish can be filleted by the machine. The amount of nape removed from the fillets is adjustable. Speed of operation, likewise, is adjustable; however, an input of about 2,100 fish per hour is average. According to the builder, a 40-percent fillet yield and 1920 pounds of skinned fillets per hour can be obtained by machine as compared with a 38-percent fillet yield with hand labor.

See illustration, over.

(over)

 ABSTRACTER: Martin Heerdt

2.19 SPOILAGE OF FISH IN THE VESSELS AT SEA: 5. BILGY FISH

McLean, Norma L. and Castell, C. H. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 13, 861-868 (November 1956)

Objective. --This study is a continuation of earlier attempts to define bilgy fish. The purposes of the study was to find an objective criterion by which bilginess may be chemically identified and measured according to the degree of fish spoilage.

Experimental. --Fish in varying degrees of bilginess were prepared by placing freshly caught dressed cod or haddock between pen boards taken from a trawler hold. The boards and the fish between them were held secure with clamps or heavy iron wire and were buried in chipped ice (lot 1). Similar dressed cod and haddock, not in contact with pen boards, were also buried in the ice as controls for comparison (lot 2). One or more fish were removed periodically from each lot for examination and analysis. Muscle tissue for use in making chemical determinations was prepared by removing both fillets from each fish, chopping them into small pieces with a sharp knife, and mixing thoroughly. Portions were weighed out for each of the determinations as follows: 100 grams each for trimethylamine, hydrogen sulfide, and mercaptans and 10 grams each for volatile acids. Muscle tissue macerated in a Waring blendor was not satisfactory for the determination of mercaptans or hydrogen sulfide.

Trimethylamine (TMA) values were determined by Beatty and Gibbons' (1937) modification of Conway and Byrne's (1933) micro-diffusion technique. Hydrogen sulfide (H_2S) was determined by the method of Brenner, Owades, and Golyzniak (1953). The H_2S was collected from an aqueous acidified solution of the fish extract with a current of carbon dioxide, absorbed in dilute zinc acetate, and combined with p-amino dimethylaniline, hydrochloric acid, and ferric chloride to form methylene blue. An Evelyn colorimeter equipped with a 660-mμ filter was used to determine the blue color. Volatile

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 ABSTRACTER: Martin Heerdt

3.12 EFFECTIVENESS OF CHLORTETRACYCLINE ON KEEPING QUALITY OF SEVERAL BOTTOM FISH

Tomiyama, Tetuo; Yone, Yasuo; Kuroki, Shunichi; Nomura, Minoru; Hara, Shotara; Shichizi, Tetu; Maeda, Toshihiro; Oda, Ichiro; and Matsuo, Toshio
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 2, 128-135 (1956) (English synopsis and tables)

The present report deals with prolongation of storage life of yellow croaker (Pseudosciaena manchuria), red sea bream (Pagrosomus major), and a species of sole (Areliscus joyneri) by treating with aureomycin on board the trawler.

The freshness of yellow croaker after landing was the best in a group which had been subject to a 10-minute dip in aureomycin (10 p.p.m.)-sea water immediately after capture, followed by holding in aureomycin (5 p.p.m.)-ice on the boat for 13 days. The second best quality was found in a group which had been kept in aureomycin (5 p.p.m.)-ice on the boat.

The combination of the dip in the aureomycin-sea water and holding in the aureomycin-ice on the boat gave a storage life at least 560 percent longer than the control, i.e., a 10-day prolongation when yellow croaker were held in the corresponding ice after landing and left in a storage room at -1° to 1°C. Under the identical conditions of storage, the holding in the aureomycin-ice on the boat without the dip treatment gave a storage life at least 360 percent longer than the control, i.e., a 5-day prolongation. A certain extension of storage life was also observed when fish were held in ice in a room at 21° to 29°C.

Little effectiveness in maintaining freshness was observed when red sea bream had been held in

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 Author's synopsis

QUALITY TESTS FOR SHRIMP

FISH SPOILAGE ABOARD BOAT

GERMAN FILLETING MACHINE

AUREOMYCIN FOR BOTTOM FISH

2.19

acids were determined by the method of Friedmann (1938). For bacterial counts, a piece of skin 4 by 4 centimeters was cut from the side of the fish on the lateral line immediately beneath the middle of the dorsal fin. The medium of Dyer, Dyer, and Snow (1946) was used for aerobic bacteria counts and the medium of Reed and Orr (1943) was used along with Brewer's petri dishes for anaerobic bacteria counts.

Results with H_2S, TMA, and volatile acids. -- Analyses of 30 fish that had been completely buried in ice (lot 2) for 1 to 18 days were tabulated in an ascending order of TMA values. This same order held for volatile acid values and for the spoilage odor of the fillets. H_2S did not increase significantly as spoilage progressed. Analyses of 30 fish that had been secured between pen boards (lot 1) were tabulated according to the ascending order of their hydrogen sulfide values which order corresponded approximately to the spoilage odor of the fillets. This odor was slightly bilgy in the range 0.04 to 0.1 milligrams (mg.) H_2S per 100 grams, bilgy in the range 0.1 to 0.5 mg. H_2S per 100 grams, and very bilgy in the range 0.5 to 1.1 mg. H_2S per 100 grams. TMA values were in poor correlation with bilgy odors.

Mercaptans. -- Plots of data on mercaptans in fish buried in ice (lot 2) showed a continued rise as storage was prolonged, whereas plots of data on mercaptans in fish in contact with the pen boards and the boards buried in ice (lot 1) showed an initial rise followed by a gradual decline. Fish buried in ice had 18 times the mercaptan value of fish held between pen boards after 10 days of storage.

Bacteria. --Anaeorbic bacteria became much more numerous on the surface of fish held between pen boards (lot 1) than on the surface of fish buried in ice (lot 2). As soon as the anaeorbic count reached one million bacteria per square centimeter of skin, the muscle tissue beneath it acquired the characteristic bilgy odor. None of the fish between boards (lot 1) with anaerobic counts of less than one million were bilgy.

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aureomycin (5 p.p.m.)-ice on the boat for 20 days. The result might be due to the shortage of ice which was noticed after landing, because subsequent storage in aureomycin (5 p.p.m.)-ice after landing showed a definite prolongation of storage-life compared to the control group held in plain ice.

Sole, which had been held in aureomycin (5 p.p.m.)-ice on the boat, were transported from Fukuoka to Osaka, about three hundred miles by train, and graded in the fish market of Osaka. It was noticed that the freshness of the fish held in aureomycin (5 p.p.m.)-ice far exceeded the control held in plain ice, particularly with respect to the body color and firmness of the flesh.

2.19 (Cross Reference: 1.85, 7.8, 8.8)

original homogenate.

Results. --A procedure based on the rapid blood glucose method of Mendel and Hoogland (1950) and revised for glycogen determination by Kleij (1951) gave reproducible results for the glycogen-sugar content of ice-stored shrimp. Glycogen-sugar increased rapidly during the first three days of ice storage, then decreased slowly until the 6th day, after which time it decreased rapidly to a minimal value. The relatively high values of the second to sixth day correlate closely with the sweet taste of the shrimp.

Lactic acid increased in shrimp for the first few days of storage in ice, but after four days it was being oxidized faster than it was being produced, which resulted in a rapid decrease in lactic acid. A less rapid rate of decrease prevailed for the remainder of the storage period. Acid soluble orthophosphate decreased very rapidly during the first few days of storage and less rapidly thereafter and throughout the remainder of the storage period.

Protein denaturation is involved in shrimp spoilage, therefore definite changes should occur in the sulfhydryl content of shrimp during storage in ice. The anticipated changes occurred in both the myosin and the water-soluble fractions of shrimp protein. Varying results were obtained, however, with different methods of analysis. Free sulfhydryl groups tended to increase appreciably during the later phase of the storage of shrimp in ice. The assumption that an increase in the degree of hydration of water-insoluble protein should occur owing to the association of water with sulfhydryl and other freed groups was found to be true. A determination of the degree of hydration of water-insoluble protein both by volumetric and gravimetric procedures supported this assumption.

The pH of shrimp stored in ice usually increased progressively from 7.2 to slightly over 8.2 after 21 days of storage. If these data are representative of the pH of shrimp taken from other areas, a value of 7.7 or below is indicative of prime quality shrimp; a value of 7.7 to 7.95 is indicative of poor but acceptable quality shrimp; and a value of 7.95 or above is indicative of spoiled shrimp.

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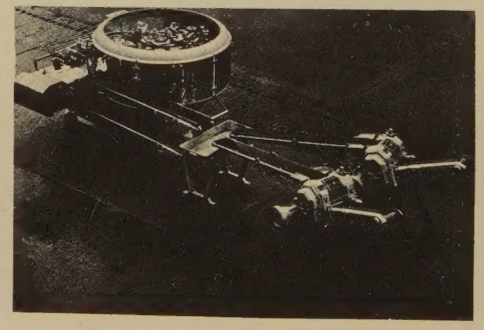

The "Baader 38" white fish filleting machine.

2.9 POISONOUS FISH

Anonymous
The Journal of the American Medical Association 163, 118-119 (January 12, 1957)

Fish poisoning.--The most curious type of fish poisoning is ichthyosarcotoxism, or poisoning resulting from eating fresh unspoiled fish of a species not ordinarily or at least not consistently poisonous. Halstead and Lively (1954) have found no evidence that any species of fish except the puffer is inherently poisonous. Outbreaks of ichthyosarcotoxism have been reported in the South Pacific, Philippines, Hawaii, and the West Indies. In the spring and summer of 1954, there were four outbreaks of ichthyosarcotoxism caused by eating barracuda in Fort Lauderdale, Florida.

In Cuba and Tahiti herring are highly toxic from May to October. In the New Hebrides, fish are most poisonous from April to July because they feed on the coral flowers which bloom during this period. Poisoning from eating fish may, however, occur at any time of the year. In New Hebrides many fish caught in the Segond Canal are poisonous, but at Shark Bay 20 miles away, fish of the same species are not poisonous. Mills (1956) has found that fish living in coral reefs and feeding on coral are more likely to be poisonous than other fish; but that the red snapper, which is a reef fish, is never poisonous. Halstead conversely reports that red snapper may be poisonous. Fish that feed along shore are said to be more dangerous than deep sea fish, but Paetro (1956) reports that poisonous fish may be found at any depth. A few of the common food fish that may be poisonous at times are pompano, horse mackerel, sea bass, perch, moonfish, and moray eels. Dack, of the Food Research Institute, believes that shellfish poisoning, tetradon (puffer) poisoning, ciguatera (from snappers and other species), and gymnothorax (moray eel) poisoning are identical, or at least are closely related. Clinically, these types of poisoning are characterized by loss of taste, ataxia, and respiratory paralysis. Scombroid poisoning from such fish as tuna, mackerel, bonito, or albacore is characterized by nausea, vomiting,

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 ABSTRACTER: Martin Heerdt

3.12 ICING COD WITH SALT-WATER ICE

Hansen, Paul (Technological Laboratory, Ministry of Fisheries, Copenhagen, Denmark)
Industrial Refrigeration 131, 20, 51 (November 1956)

Ice frozen to simulate that made from "sea" water and "brackish" water were compared with ice made from fresh water in their usefulness in preventing spoilage of headed and gutted cod. Ice was frozen in a slice-ice machine from (1) ordinary tap water, (2) tap water containing 1-percent sea salt, and (3) tap water containing 3-percent sea salts.

Headed and gutted cod, weighing about 2.2 pounds each, were divided into three equal batches and iced in ordinary wooden fish boxes with the above-mentioned types of ice, three parts of ice to two parts of fish. Electrical resistance thermometers were inserted permanently for periodic recording of the temperatures along the backbone of 3 to 4 fishes in each batch.

In the fish iced with fresh-water ice, temperatures of from 31.5° to 31.3° F. were measured during the entire icing period. The fish iced with brackish water ice showed temperatures between 31.1° and 30.2° F. during the first few days; then there was a temperature drop to 29.7° F. followed by a slow rise to 31.1° F. Temperatures in the salt-water iced fish fell during the first two days until a minimum temperature of 28° F. was observed on the third day of icing. From that day the temperature rose gradually until at the end of the experiment, after 17-days icing, the remaining fish of this batch showed temperatures around 31.1° F., similar to those of the other two batches.

Characteristics of partial freezing, stiffness, and ice formation in the tissues, were observed in the fish iced with salt-water ice during the period in which the temperatures below 30.6° F. were recorded.

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 ABSTRACTER: Kathryn L. Osterhaug

3.12 THE PRESERVATIVE ACTION OF ACID SUBSTANCES IN FOOD

Ingram, M. (Low Temperature Research Station, Cambridge); Ottaway, F. J. H.; and Coppock, J. B. M. (British Baking Industries Research Association, Chorleywood, Herts, England)
Chemistry and Industry (London) No. 42, 1154-1163 (October 27, 1956)

Introduction.--Modern handling of foodstuffs based on short harvest periods, and long transportation hauls through areas of varying climatic conditions, requires special preservation procedures. The general trend to prepacking foods increases the problem manyfold. The manufacturer must maintain nutritional values, and not use preservatives which are either toxic or which impair palatability. Preservatives approved by the Public Health Regulations are chiefly acids or their salts.

Mode of action of acidic substances.--The function of a preservative is primarily to prevent the growth of microorganisms. An acid substance may function in three ways: (1) to lower the pH, (2) to function as an undissociated molecule, or (3) to produce specific effects. An acetic acid system buffered to a pH of about 3 is most effective in preventing microbial growth and proteolysis. It also lowers the heat resistance of organisms and makes possible lower processing temperatures. It is believed that the undissociated acid functions as a preservative because uncharged molecular units penetrate cells more readily than charged ions. Most foods have a high buffering power and the preservative can frequently be added in the form of a salt. It is safer, however, to use the acid since the careful control of pH is usually necessary.

Specific differences of preservatives depend on (1) the ease with which they penetrate the cell, (2) the part of the cell which they attack, and (3) the chemical nature of that attack. Penetration is related to lipoid solubility and depends on a heteropolar molecule having a hydrophilic carboxyl group and a lipophilic radical. Since heteropolar molecules tend to congregate at phase boundaries they migrate

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 ABSTRACTER: Claude Thurston

3.17 PRESERVATIVES - USE IN ICE

Anonymous
Die Fischwirtschaft 7, No. 11, 301 (November 1955) (Bremerhaven-F, Germany)
World Fisheries Abstracts 7, 27-28 (September-October 1956)

Free thiocyanic acid (HCNS) stabilized by the Weidner process (Editor's Note: details of this process are not given) can be used to improve the keeping quality of food. Stabilized thiocyanic acid, when taken orally in therapeutically large doses, is not poisonous. By its use, fish can be kept in fresh condition for longer periods. Pure cultures of 10 types of psychrophilic bacteria found on the surface of fish including strongly haemolytic and fluorescent types were killed by 0.05 to 1% Weidnerit solution containing 0.0025 to 0.05% free HCNS. In a test solution with 0.25% Weidnerit solution (0.01% free HCNS), all the 10 types of bacteria were killed within 16 hrs. Experiments were also conducted with plaice, herring, pollack, filleted cod, etc., by packing the fish in wooden barrels of 28 cm. (11 in.) in diam. and 15 l. (3.96 gal.) capacity and perforated at a height of 10 cm. (4 in.)) to drain melted ice. The fish were packed with 5 cm. (2 in.)) thick layers of ice at the bottom and covered with another 5 cm. thick layer of the same type of ice. Three different types of ice were used: ordinary crushed ice, 1% and 3% Weidnerit ice, resp. The filled barrels were put into an aluminum container and covered with a 10 cm.-thick layer of ice. After 21 days, the condition of fish stored with ordinary ice varied from fish to fish, and with fillets the smell and appearance had greatly changed. With Weidnerit ice, the concentration had no effect after the first 5 or 6 days and the plaice and herrings were still very fresh. Weidnerit ice extends the keeping quality of fish by at least 5 days. Stabilized HCNS is a well-known pharmaceutical substance with a specific effect on pathogenic bacteria and can be used without any ill effect to extend the keeping quality of fish.

 ABSTRACTER: G.N. Subba Rao

POISONOUS FISH

ACIDS AS FOOD PRESERVATIVES

SALT-WATER ICE

ANTISEPTIC ICE

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from the solution to the cell surface, and may interfere with permeability. A very important specific effect of a preservative is the tendency to block the metabolism of micro-nutrients such as the B vitamins.

Review of the preservative action of some acidic substances. -- The bacteriostatic and fungicidal properties of the following acids and their salts are discussed: (1) benzoic acid and related compounds, (2) vanillic acid esters, (3) acetic acid and its salts, (4) monochloracetic acid, (5) propionic acid and its salts, (6) dehydroacetic acid, (7) sorbic acid, (8) fatty acids and salicylates, (9) sulfur dioxide and sulphites, (10) boric acid and borates, (11) acid calcium phosphate, and (12) nitrites. All of these are approved to varying extents by the Public Health Regulations.

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flushing, giant urticaria, headache, and respiratory distress. Elasmobranch (shark) poisoning that results from eating the liver and is characterized by malaise, joint pains, headache, nausea, vomiting, diarrhea, prostration, ataxia, itching, desquamation, respiratory distress, cold sweats, and delirium. Fresh-water fish (minnow) poisoning that results from eating the ovaries or roe during the reproductive season of the fish is characterized by headache, fever, vertigo, vomiting, abdominal cramps, and diarrhea.

No immunity exists, and no specific antidote is known for any of these types of fish poisoning. The incubation period before symptoms appear after eating poisonous fish, varies from a few minutes to several hours, as many as 60 percent of the severe cases of fish poisoning may die. Recovery is slow. Some observers have tried to link poisoning to the diet; the presence of poisonous metallic ions in the fishes' environment; the size, sex, or stage of maturity of the fish; bacterial contamination; or spawning activity. None of these theories explain all cases, and for some there is little or no supporting evidence.

The treatment is symptomatic and efforts must be made to combat shock. The only way to detect the poison before eating the fish is to feed some of it to an animal and observe the animal, consequently prevention is difficult. To obtain a sample of the fish believed to have caused the poisoning is usually difficult, and another sample of the same species of fish may not be poisonous. Fish poisoning is a special hazard to vacationers and sportsmen who visit or fish in tropical or subtropical waters. A greater knowledge of the chemical and pharmacological properties of the causative toxins and a reliable means of recognizing poisonous fish is needed.

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The results of taste tests on the cooked fish are given in table 1. The average scores both for flavor and for texture were in favor of the "sea" water iced fish.

Table 1. Average Taste Score and Standard Deviation

Ice (days)	7	9	11	14	17
"Sea" water	7.6 (0.3)	7.1 (0.4)	6.5 (0.4)	5.1 (0.3)	3.1 (0.7)
"Brackish" water	7.2 (0.4)	6.6 (0.4)	5.8 (0.4)	4.3 (0.5)	2.2 (0.6)
Fresh water	6.5 (0.3)	5.5 (0.4)	5.8 (0.4)	4.2 (0.4)	1.6 (0.5)

Figures in parentheses indicate the square root of the variance of each average score.

3.12 PRESERVING SHRIMP QUALITY AND BEAUTY

Fieger, E. A.; Novak, A. F.; and Bailey, M. E. (Louisiana State University); McConnell, J. N. and Viosca, P., Jr. (Louisiana Wildlife and Fisheries Commission)
Southern Fisherman Year Book for 1956, 16, 21-23, 81, 82 (November 30, 1956)

A group of workers at Louisiana State University has been studying the causes and prevention of undesirable changes in ice-stored and in frozen shrimp for the past twelve years.

The development of melanosis or black spots at the edges of the shell segments has been a serious problem in the storage of fresh iced shrimp. Research has indicated that this is caused by enzymes that are present in certain parts of the shrimp. Since 1952, work on the prevention of melanosis in shrimp has included the use of ices containing chemicals that are known to be effective, as well as of dips in solutions of these same chemicals.

First experiment.--A catch of mixed white and brown shrimp was separated from the trash fish, and then iced on board ship. The shrimp were headed, divided into three portions of 15 pounds each and soaked for 10 minutes in four gallons of the following solutions made with fresh water: (1) control, (2) sodium bisulfite (1,000 ppm), and (3) sodium bisulfite (1,000 ppm) plus chlortetracycline (50 ppm).

The shrimp from each treatment were drained for two minutes and divided equally into eight waxed cartons. All cartons were kept well iced and stored in a room at 45° F. One carton from each treatment was removed on alternate days for examination.

Second experiment.-- A second catch of shrimp was separated from the trash fish, thoroughly

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 ABSTRACTER: Kathryn L. Osterhaug

3.12 USE OF ANTIBIOTICS IN PROLONGING STORAGE LIFE OF DRESSED CHICKEN

Ayres, John C.; Walker, Homer, W.; Fanelli, Mary Jeanne; King, Albert W.; and Thomas, Fred (Iowa State College, Ames, Iowa)
Food Technology 10, 563-568 (November 1956)

Studies by Kohler et al. (1955) and by Ziegler and Stadelman (1955) have shown that the spoilage of fresh dressed chickens can be delayed if the chickens are dipped in water solutions of chlortetracycline.

Purpose.--This present study was made to test the effect of dipping eviscerated poultry for 2 hours in antibiotic solutions and antifungal solutions held at 1.7° C.

Experimental.--Spoilage inhibitors tried out were 1, 3, 10, 30, 90, and 270 parts per million (ppm) of chlortetracycline (CTC) and 3, 10, and 30 ppm of oxytetracycline (OTC), tetracycline (TC), and streptomycin. Later tests were made with the antibiotics at a level of 10 ppm only and with the following additional antibiotics: neomycin, mycostatin, aerosporin, A-5288 (Lederle), ascosin, and rimocidin.

Whole or cutup chickens, mostly 2 to 2½-pound fryers, were killed, semi-scalded (58° to 60° C.), plucked, eviscerated, and washed but not iced at a commercial poultry processing plant. Local chickens were transported to the laboratory immediately after they were washed. Chickens from outside of Ames, Iowa, were packed in polyethylene bags and transported in chipped ice.

Bacteriological samples were obtained from portions of the surface of the birds by the swab

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 ABSTRACTER: Martin Heerdt

3.12 CHEMICAL ICES FOR SHRIMP PRESERVATION

Fieger, E. A.; Bailey, M. E.; and Novak, A. F. (Louisiana State University, Baton Rouge)
Food Technology 10, 578-583 (December 1956)

Recent developments in the shrimp industry have emphasized the problems of maintaining quality during handling. Larger vessels now make longer trips to the shrimping grounds. New species of shrimp now being exploited are more susceptible to deterioration in refrigerated storage than those formerly taken. Fresh shrimp are being transported longer distances to retail markets and the prepackaging of fresh shrimp is growing. These practices provide opportunities for deteriorative changes. The shrimp industry is searching for methods that will prolong the storage life of fresh shrimp.

When shrimp are stored in dry refrigeration, or when they are otherwise stored without constant contact with water as is achieved by ice storage, melanosis (black spot) becomes a primary problem. Frozen storage is undoubtedly the best method of preserving the quality of freshly caught shrimp, but black spot is prevalent even in this type of storage.

Commercial practice for storing fresh shrimp is to place them in alternate layers between crushed ice. It is desirable, therefore, to develop improved methods of ice storage. The present series of investigations was undertaken, (a) to determine the effect of chemical ices on the storage life of fresh shrimp, (b) to study the effect of several different chemical ices on the prevention of black spot in ice-stored shrimp, and (c) to determine the value of several chemical and physical tests as indicators of the relative quality of stored shrimp. Previous work has shown that the maximum storage period in regular ice for shrimp is about 2 weeks.

Experimental.--Five storage tests were conducted using a total of twelve different chemical ices. The shrimp used were obtained either directly from trawler owners or from shrimp processing plants. Table 1 (see over) presents a summary of the conditions and results of the experiments.

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 ABSTRACTER: Kathryn L. Osterhaug

3.33 CANNING METHODS AND EQUIPMENT - RETORTS

Anonymous
Die Fischwaren- und Feinkostindustrie 27, No. 9, 158 (September 1955) (Bremerhaven-F, W. Germany)
World Fisheries Abstracts 7, 39-40 (September-October 1956)

(a) The sterilization in rotary autoclaves was used for the first time in the U.S.A. for sterilizing concentrated milk. The long experience with this equipment has shown the success of this treatment which depends on the following factors: rotation speed of the autoclave drums, size and shape of the cans, consistency of the can contents and degree of filling of the cans. The article also refers to the accelerated sterilization of the cans by rotation on their ends. At 130° C. (266° F.) and 193 r.p.m. the retorting of the cans is reduced to one-fifth because of the effect of the agitation and the centrifugal force.

In W. Germany, the following conclusions have been reached with respect to rotating autoclaves: the increase of temperature by this method is much faster than when using a "still" retort; the center of the canned product reaches about 117° C. (242.6° F.) at the end of 15 min. By using conventional autoclaves these processing times would be much longer. On an average the sterilization time fluctuated between 35.5 and 75% but sometimes it was possible to decrease them even more by accelerating the rotation. Another advantage is the speed of cooking which avoids the product from taking on a taste like the 'canned' food. In the case of canned meat, fish and vegetables sterilized in rotary autoclaves, the flavor does not differ from the fresh product. The reduction of the sterilization time does not in any way affect the keeping qualities of the product. In the above-mentioned tests, the cans sterilized in 'still' retorts and kept at 37° C. (98.6° F.) for 5 to 10 days developed swells sometimes, revealing fermentation, while the containers processed in rotary autoclaves did not show signs of alteration even after 4 weeks.

 ABSTRACTER: Francisco Hoyos

DIPS FOR ICED SHRIMP

CHEMICAL ICES FOR SHRIMP

ANTIBIOTICS FOR DRESSED FOWL

ROTARY AUTOCLAVES

3.12 (Cross Reference: 1.85)

Table 1

Test no.	History of shrimp sample	Ices used	Length of storage in days
8	Peneaus aztecus, size count 31-35, caught 36 hrs. prior to purchase.	(a) commercial ice (b) CTC ice, 1 ppm (c) sodium bisulfite ice, 100 ppm (d) ascorbic acid-citric acid (8-92) ice, 1000 ppm	15
9	Mixed Peneaus setiferus and Peneaus brasiliensis, size count 41-50, caught day of purchase.	(e) commercial ice (f) CTC ice, 5 ppm (g) sodium bisulfite ice, 1000 ppm	16
10	Peneaus setiferus, size count 26-30, composite from several trawls, stored on trawler from 1 to several days.	(h) commercial ice (i) CTC 5 ppm plus sodium bisulfite, 1500 ppm ice (j) sodium bisulfite ice 1500 ppm. Ices (i) and (j) were prepared by using Sea Kem No. 9 as dispersing agent	15
11	Peneaus setiferus, mixed size, caught 6 hrs. prior to purchase.	(k) commercial ice (l) acid ice (HCl to pH 5.0) (m) Fran-Kem ice, 500 ppm (n) tannic acid ice, 500 ppm	16
12	Peneaus setiferus, size count 41-50, headed, washed and iced on trawler by members of the staff.	(o) commercial ice (p) CTC ice, 10 ppm using Sea Kem No. 9 as dispersing agent (q) salt ice, 22,000 ppm, consisting of sodium chloride, 20,000 ppm, plus calcium chloride, 2000 ppm	21

Samples of the treated shrimp were removed for examination at regular intervals during 20-days storage.

Results.--1. Storage of shrimp in cartons and in aluminum pans resulted in lower bacterial counts than those obtained on shrimp stored in direct contact with melting ice.

2. Sodium bisulfite plus chlortetracycline and citric acid plus ascorbic acid dips retarded melanosis for 11 days, but were ineffective for longer periods of storage.

3. A sodium bisulfite dip resulted in reduced melanosis through 14 days of storage.

4. Chemical dips used in these experiments had no noticeable effect upon the general flavor of the shrimp, although they retarded off-odors.

3.12 (Cross Reference: 1.85, 2.15)

washed with sea water, headed and the tails stored in ice until the final drag was made. They were then thoroughly mixed and divided into five portions. The individual lots were soaked for 10 minutes in the following fresh-water solutions, drained two minutes, divided into aluminum pans with covers and packed in ice. Solutions used for soaking included: (1) control (fresh water), (2) citric acid (1,000 ppm) plus ascorbic acid (1,000 ppm), (3) sodium bisulfite (2,500 ppm), (4) sodium bisulfite (2,500 ppm) plus chlortetracycline (50 ppm), and (5) chlortetracycline.

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technique and also by rapidly dipping the birds up and down 50 times in sterile water to remove bacteria and sampling the rinse water. Microbiological populations were determined at 2-day intervals up to 18 days on nutrient "fluorescein," malt, and eosinmethylene blue agars.

Results.--At concentrations of 3 or 10 ppm, CTC was the most effective antibiotic of the group tested for prolonging the storage life of birds held at 4.4°C. At concentrations of 30 ppm, OTC was comparable to CTC, whereas at the lower concentrations used OTC was second in effectiveness to CTC. Other antibiotics and antifungals included in the study showed little or no improvement over the controls with regard to prolonging storage life.

The amount of CTC present on the skin of treated chickens decreased rapidly, yet persisted in low concentrations for 21 days or longer. Chicken tissue absorbed as much as 7.8 percent water during the dipping period of 120 minutes, but preferential absorption of antibiotics was not observed.

Pseudomonas-achromobacter type organisms increased during storage so that they made up 90 to 95 percent of the microbiological population by the time that the birds developed off-odor and slime. Yeasts increased to as much as 5 percent of the population in CTC-treated chickens, whereas coliforms, micrococci, and chromogens tended to decrease during storage. Rimocidin and A-5288 were the most effective of the group of antifungals tested for inhibiting yeasts, but they had only a limited preservative effect. The authors suggest that a combination of antibiotics may be found that will markedly retard the development of both fungi and bacteria by their complementary action.

3.19 REGENERATION AND STABILITY OF OXYMYOGLOBIN IN SOME GAMMA IRRADIATED MEATS

Tappel, A. E. (Department of Food Technology, University of California, Davis)
Food Research 21, 651-656 (November-December 1956)

Meat irradiated in an excess of oxygen becomes brown in color with the formation of metmyoglobin either immediately after irradiation or upon subsequent storage. This oxidative change can be avoided by irradiation in the range 0.05 to 3 megarep in an inert atmosphere or in a high vacuum. This paper describes observations made during the regeneration of oxymyoglobin by gamma irradiation of meat (1) to prove that oxymyoglobin is a bright red color pigment of irradiated meat and (2) to propose a chemical mechanism for its regeneration.

Materials and irradiation. --In this study, pork, beef, and chicken were irradiated at 0, 0.7, 1, 2, 4, 8, 16, and 34 megarep; tuna was irradiated at 0, 0.2, 0.5, 1, 2, and 4 megarep; lamb, veal, and turkey were irradiated at 0.5, 1, 2, 4, 8, and 16 megarep; and pork and beef were irradiated at 3 megarep. The irradiated foods were stored for one month at 70° F. and at 95° F. Purified methemoglobin obtained from beef was irradiated at 2 and at 8 megarep.

Spectral analysis. -- Extracts of meats were prepared for the measurement of absorption spectra and reflectance spectra. Each meat was blended for 30 seconds in water in an atmosphere of air. Beef, veal, and lamb were prepared at a concentration (conc.) of 25 grams (g.) of meat per 250 milliliters (ml.) of water; tuna, at a conc. of 20 g. per 60 ml. of water; chicken and pork, at a conc. of 50 g. per 150 ml. of water; and turkey, at a conc. of 60 g. per 100 ml. of water. All extracts were settled by gravity and the aqueous portion was filtered. The visible spectra (380 mμ to 650 mμ) of the extracts from the irradiated samples and their controls were recorded on a Beckman DR Recording Spectrophotometer.

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

3.23 REFRIGERATION OF FISH: PART 2 - HANDLING FRESH FISH

Butler, Charles (Technological Section, Fish and Wildlife Service, Washington, D. C.); Dassow, John A. and Heerdt, Martin (Fishery Technological Laboratory, Seattle, Washington); Carlson, C. J. (Fishery Products Laboratory, Ketchikan, Alaska); Carver, Joseph (Fishery Technological Laboratory, East Boston, Massachusetts)
Fishery Leaflet 428, 84 pp. (December 1956) (United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.)

A review of the basic principles in spoilage of fish, handling and icing fish aboard vessel, and the handling and preparation of fish at shore plants including filleting and steaking operations. Complete with literature references and numerous photographs.

SPOILAGE OF FISH PRIOR TO FREEZING

Causes of deterioration
Enzymatic action
Oxidative action
Bacterial action

HANDLING OF FISH ABOARD THE VESSEL

Handling procedure
Effect of fishing methods on quality
Relation of fish species to handling methods
Good "housekeeping" aboard the vessel

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: John A. Dassow

3.19 EFFECT OF IONIZING RADIATIONS ON CAROTENOID STABILITY

Lukton, A. and Mackinney, G. (University of California)
Food Technology 10, 630-632 (December 1956)

This paper reports on the stability to gamma radiation (from a cobalt 60 source) of carotenoids in various materials including prawns and oil from salmon.

EXPERIMENTAL

Source of material. -- Raw prawns were shelled and ground in a mortar. After irradiation, prior to extraction, they were boiled for 4 minutes in order to give them the same heat treatment as the boiled samples. The boiled samples were boiled for 4 minutes in the shell, then were shelled, ground, and irradiated.

The salmon oil was obtained by direct ether extraction of fresh salmon flesh.

Handling of samples. -- Samples were irradiated at room temperature by exposure to gamma rays from a cobalt 60 source at the Stanford Research Institute.

Analytical methods. -- All of the samples, except for the pure pigment solutions and the oils, (which were merely diluted with petroleum ether for determination of optical densities) were extracted with acetone. The extract was transferred to petroleum ether, which was then washed and dried with anhydrous sodium sulfate. With samples in which pigment losses were heavy, the extracts were chromatographed. For salmon oil, chromatographic measurements were made at 470 mμ.

RESULTS

Table 3 lists the carotenoid contents in μg per gram of tissue before and after irradiation. Values for the prawn carotenoid are given in terms of the optical density of the extract at 470mμ. A similar

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Kathryn L. Osterhaug

3.335 STUDIES AND RESEARCHES ON THE MANUFACTURE OF CANNED MOROCCAN SARDINES

Meesemaecker, R. and Sohier, Y.
Cah. Lab. Froid Cons., Ain-Sebaa, Casablanca No. 2, 105 pp. (1956)
Food Science Abstracts 28, 565 (December 1956)

The Moroccan sardine contains 64 to 72% of edible material, the proportion increasing with increased fat content; the head and viscera make up 16 to 26% and 9 to 12%, respectively. Water content ranges from 62 to 76%, fat from 17.0 to 0.4%, protein from 18.2 to 25.6%, inorganic salts other than chlorides from 3.1 to 3.9%, and chlorides from 0.2 to 2.0%, the sardines being salted before reaching the laboratory. The water content (on a fat-free basis) is 74.6% in March, when the sardines are lean, and 70% in October, when they are fat. The fat content of the head remains higher than that of the rest of the body in the lean period.

The sardines are usually salted when they are caught, and again on landing, and after evisceration. Absorption of salt by the fish increases with concentration of brine, duration of brining, and temperature, and may rise to 5%; 40 to 60% of this is lost on steam-cooking. Brining always causes some degree of dehydration of the fish flesh.

Optimum duration of steam-cooking increases with decreasing content of fat; the presence of water in the oil drained from canned sardines is shown to be a proof of insufficient cooking. The exudation of water from sardines during sterilization increases with sterilizing temperature in the range 110° to 120° C, but not with duration of heating; hence processing at lower temperatures for longer times is recommended. Loss of weight in sardines during steam-cooking ranges from 19 to 32%, increasing with decreasing fat content; the loss is mainly water and salt, with some protein and

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 11
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Reprinted in whole

IRRADIATED MEAT PIGMENTS

RADIATION OF CAROTENOIDS

PREPARATION FOR FREEZING

CANNED MOROCCAN SARDINES

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procedure was used in table 4 to demonstrate changes in the various oils as affected by the radiation.

Sample	Dose rep x 10^6	Astaxanthin O. D. 465 air	Sample	Dose rep x 10^6	Astaxanthin O. D. 465 air
raw prawns	none	.393	boiled prawns	none	.356
	1	.218		1	.261
	2	.239		2	.180
	4	.164		4	.165

The carrot root oil proved to be quite stable, with a loss of 10 percent in the carotenoid at 1 million rep, whereas 66 percent destruction was observed in salmon oil. The carotenoid-protein complex in the prawns was also unstable. Hydrolysis of the complex by cooking is evidently not a significant factor.

Sample	Dose rep x 10^6	Optical density air	Optical density nitrogen
pigment in salmon oil	none	.498	.498
	.250	.393	.380
	.500	.300	.278
	1.00	.170	.113

CONCLUSIONS

The authors concluded that the losses incurred by carotenoids on irradiation depend upon the extent to which free radicals from the hydrocarbon solvent or peroxides from the lipids are available to react with the carotenoid. In this connection, it is of interest that losses in air were frequently slightly lower than in nitrogen. This would imply a competition for the free radical between the oxygen present and the carotenoid. A peroxide formed from the fat would react much more slowly than a free radical with the carotenoid.

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very little fat, and represents only 5 to 8% of the nutrients in the fish, which consequently have a higher nutritive value per unit weight after cooking.

Drying the sardines in hot air after steam-cooking is unnecessary if they have been adequately cooked; it markedly increases the amount of oil absorbed by the fish (unless the drying is excessive). This absorption occurs mainly during sterilizing, and increases with decreasing fat content of the fish, being from 0 to 2% for fat sardines, and 6 to 8% for lean sardines; it also increases with increasing loss of water during steam-cooking, and with increasing temperature of sterilization.

The amount of oil absorbed is much the same with groundnut, soya bean, olive, cottonseed, and refined sardine oils, and is not affected by the temperature of the oil when it is added. Exchanges between the oil added in canning and the fat of the sardines occur chiefly during sterilization and the first few days after; with sardines of naturally high fat content, the fat of the drained canned fish is found to be a mixture of about equal parts of sardine and vegetable oils, whereas with lean sardines the proportion of vegetable oil may rise to 90%. Sardines canned in tomato sauce absorb liquid from the sauce if they are over-cooked or over-dried, and release liquid if under-cooked; lean sardines may absorb up to 50% of the fat in the sauce, and fat sardines may release a small amount of their oil.

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Results and discussion. -- All of the meats irradiated under nitrogen had a color that varied in intensity from bright pink to bright red. Destruction of the hematin pigments occurred at irradiation levels of 16 and 34 megarep. The most pronounced color difference appeared between the control and irradiated tuna and between the control and irradiated pork. The control tuna and pork were tan and tan red, respectively, because of the formation of metmyoglobin. Metmyoglobin formation is due to the oxidation of the myoglobin which occurred at the low oxygen partial pressures that exist in these meats when they are packed in cans in nitrogen. Extracts of control tuna gave a spectral absorption curve for metmyoglobin with inflection points at the maximum for metmyoglobin or 630 mμ and 500 mμ. The extract of tuna, which was irradiated at 2 megarep, showed the spectral characteristics of oxymyoglobin with the alpha band at 575 mμ, the beta band at 538 mμ, and the Soret or gamma band at 418 mμ. Extracts of pork controls showed large amounts of metmyoglobin as well as oxymyoglobin with absorption maxima at 630 mμ and 500 mμ for metmyoglobin and at 580 mμ and 542 mμ for oxymyoglobin. Pork extracts irradiated at 2 megarep showed a spectral absorption of essentially complete conversion of metmyoglobin to oxymyoglobin.

Maxima and minima absorption wave lengths of extracts of a variety of control and irradiated meats are also tabulated. Reflectance spectra data was obtained to check against the possibility of creating pigment artifacts by aqueous extraction. Tuna and pork irradiated at 2 megarep had reflectance spectra that showed all of the characteristics of oxymyoglobin. The heat lability of the irradiated tuna and pork was tested to eliminate the possibility of the formation of nitric oxide myoglobin and carboxymyoglobin. Cooked pork and tuna lost all red color and took on the tan color of hematin to show the absence of heat stable nitric oxide hemochrome and carboxyhemochrome. The authors suggest that the regeneration of oxymyoglobin involves the reaction of metmyoglobin with free radicals. Irradiation of purified metmyoglobin in aqueous solution produced some oxymyoglobin.

3.23 (Cross Reference: 2.01, 2.15, 2.2, 2.3)

Sorting, dressing, and washing fish on deck
Fresh-water ice
Salt-water ice
Bactericidal ice
Mechanical refrigeration as an ice auxiliary
Other methods of holding fresh fish aboard the vessel

HANDLING FRESH FISH AT THE SHORE PLANT

Good housekeeping practices
Grading fish and shellfish for quality
Diversity of methods of handling fish and shellfish
Preparation of round and dressed fish--handling of fresh-water fish as an example
Preparation of fillets--handling of New England groundfish as an example
Preparation of frozen steaks--handling of halibut, salmon, and sablefish as examples
Handling of fish frozen at sea--processing of tuna at the cannery as an example
Handling of shellfish preliminary to processing
Recommendations for the control of quality at the shore plant

Fishery Leaflet 428 is available free from the U. S. Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.

3.2341 AUTOMATIC QUICK FREEZING

Holt, Lawrence
Fishing Gazette 74, 34, 55 (January 1957)

A Gloucester, Massachusetts fish stick producer needed a method of quick freezing that would save time and labor and that would be consistent with the highest standards of quality control.

The aim of their engineering department was to convert the fish sticks as they come from the fryer at 400° F. to a solid frozen state at zero degrees, package, carton, and deliver to frozen storage within an hour's time. This meant that the time allowable for a fish stick to be in the sharp freezer was twenty minutes and the capacity of the freezer had to be 2,500 pounds per hour.

To bring the fish sticks down from the 400° F. fryer temperature to a practical temperature for entering the freezer, an atmospheric cooler with conveyor was designed. The fish sticks leave the cooler at 120° F.

A special freezer was designed to handle the fish sticks. The design as developed, resulted in a freezing tunnel approximately 40 feet long, by 13 feet high, by 16 feet wide. It is insulated on all sides, top and bottom, and contains all of the necessary freezing apparatus. The conveyor consists of thirteen tiers along which the wire trays of fish sticks move back and forth through the air stream. The 4-foot square trays enter at the lowest tier in the freezing tunnel and leave, at 0° F. and solidly frozen, at the highest tier. On leaving the freezer they are delivered by another conveyor to the packaging and cartoning equipment.

The freezing conditions in the tunnel are provided by three spray coolers. Chilled air from them

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 ABSTRACTER: Kathryn L. Osterhaug

3.237 INFRA-RED COOKING OF FISH STICKS

Anonymous
Canner and Freezer 123, 35 (December 24, 1956)

A plant in Wheatley, Ontario, Canada is cooking fish sticks by infra-red heat. By this method, only the fat that drips on the fish stick is subjected to cooking temperatures. The excess oil drops into a tank below the oven where the temperature never rises above 260° F. The low oil temperature helps prevent breakdown of the oil.

The steps used in preparing these fish sticks for market include cutting to size, battering, breading, basting, cooking, draining, cooling, packaging and freezing.

The fish sticks are cut out of frozen blocks of prepared haddock fillets brought in by boat from Newfoundland. Bandsaws are used for this operation. The sticks are then battered and breaded in a breading machine. The breaded sticks are carried by conveyor belt through the infra-red oven in approximately 3¼ minutes. The basting oil is literally squirted on both sides of each stick. Circular reflectors on each side of the oven bathe the sticks in uniform heat. They are automatically turned over at the proper time to insure adequate exposure to all four sides.

After cooling to room temperature, the sticks are packed in cartons, overwrapped with cellophane, and frozen.

Several distinct advantages are claimed for the infra-red process. One of the most significant advances is the uniform rate of flow of cooking oil applied per stick. The basting method uses a pipe through which the oil flows, its rate controlled by a tap. As a result, the amount of oil picked

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 ABSTRACTER: Kathryn L. Osterhaug

3.234 INFLUENCE OF FREEZING-RATE ON THE DENATURATION OF COLD-STORED FISH

Love, R. M. (Torry Research Station, Aberdeen)
Nature 178, 988-989 (November 3, 1956)

Temperature of storage is the most important single factor responsible for the gradual changes that take place in frozen muscle. The rate of freezing, however, is more important than it formerly was believed to be.

Objective.--The present work was designed to study denaturation as it is related to the distribution of ice in fillets of North Sea cod (Gadus callarias). Ice distribution in the fillets was indicated indirectly by a recent technique that uses the amount of deoxyribose nucleic acid in the intercellular fluid as a measure of the amount of cell damage. Denaturation was measured by the percentage of muscle proteins that would dissolve in neutral 5-percent sodium chloride solution. The reproducibility and accuracy of this method was improved by taking into account most of the biological variation which normally destroys much of the usefulness of the method.

Experimental.--Fillets were stacked and frozen in vertical piles on an aluminum plate maintained at -78° C. with solid carbon dioxide. This method of freezing yielded fillets that were frozen over a range of conditions. Fillets afterward were stored at -14° C. for 86, 108, 148, and 162 days, and at -30° C. for 328 and 390 days.

Findings.--Data obtained clearly demonstrates existence of large differences in the amount of denaturation in fish frozen at different freezing rates. Denaturation was relatively low where high-speed freezing produced small intracellular ice columns. Denaturation increased steadily with slower

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 ABSTRACTER: Martin Heerdt

3.338 CANNING - CONTAINERS - ALUMINUM

Anonymous
Food Trade Review 25, No. 11, 14 (November 1955) (London)
World Fisheries Abstracts 7, 41-42 (September-October 1956)

An A1-Mg (F50S) alloy for making cans is being used in the Norwegian sardine canning industry. This has a higher mechanical strength than the 3S alloy which was formerly used. The advantages of aluminum for sardine cans are as follows: (i) no blackening of the cans; (ii) no metallic smell or taste; (iii) no solution of the metal in the food; (iv) easy opening of cans; (v) light weight of the cans. A Norwegian company introduced the first continuous anodized strip operation in 1939. This method was based on the standard sequence of degreasing, rinsing, anodizing in dilute H_2SO_4, sealing in boiling water, and drying. Its outstanding feature is the continuous handling of the coils. The apparatus is arranged in 2 stories so that unrolling and rolling of the strip can take place in adjacent positions. In the course of processing, the strip doubles back and is re-coiled at a station close to the uncoiling equipment. The processed strip is then ready for shipping and fabrication. Further protection is imparted by a combined anodizing and lacquering process, which has greatly expanded the variety of food products which can be packed in aluminum cans. The merger of these 2 processes, while avoiding increased manufacturing costs has improved the competitive position of aluminum in the canning industry. This process is used now on all canning strips produced in Norway.

Because lacquering provides an additional protective film on the surface of the aluminum, the corrosion resistance of anodic film itself is not of such decisive importance. As a consequence, alkaline degreasing, which had to be effected before lacquering commenced, may be omitted in favor of simultaneous degreasing and anodizing. This is accomplished through the addition of a degreasing component to the H_2SO_4 electrolyte, thus reducing processing time. As the pores in the

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FISH STICK FREEZER

FREEZING RATE VS. DENATURATION

INFRA-RED COOKED FISH STICKS

ALUMINUM CANS FOR FISH

3.234

freezing to a maximum value at the point where the largest possible intracellular ice columns were produced. At this point the proteins were compressed into narrow strips along the margins of the cells. In still more slowly frozen fillets in which cells had burst open, denaturation decreased. A further decrease in denaturation occurred when ice began to appear in the intercellular spaces. At freezing times of 200 to 250 minutes for cooling from 0° to -5° C. all ice was intercellular, fibers were no longer ruptured, and denaturation was at a minimum. In fillets that were very slowly frozen over a period of 500 minutes or more, a gradual increase in denaturation occurred, probably as a result of dehydration because the ice front moved so slowly that osmosis occurred outward from the cells. Important factors affecting denaturation, therefore, appear to be the mode of ice formation and distribution and the resulting concentration patterns of tissue salts rather than the actual mechanical damage to the cell walls.

Storage results. -- Cod fillets frozen in 220 minutes and stored for 390 days at -30° C., showed a large difference in the amount of denaturation that had occurred as compared with cod fillets frozen in 70 minutes and stored for 390 days at -30° C. Deoxyribonucleic acid measurements indicated a change from intra- to inter-cellular freezing that began in cod fillets after 60 minutes of freezing and was complete after 130 minutes of freezing. Curve smoothness of plotted data underlined the accuracy of the denaturation measurements. Fillets that had been stored at -14° C. for 162 days, did not show this pattern because denaturation was almost complete at all rates of freezing. The quantity of expressible fluid obtained under standard conditions from cod fillets was almost identical regardless of the rate of freezing.

The relative degree of toughness as measured organoleptically suggests that the relation between toughness and denaturation is not a simple one, at least at low storage temperatures. In cod fillets that had a freezing time of 220 minutes, 88.2 percent of the proteins were soluble or only slightly less than the 95 to 96 percent solubility of fresh cod proteins. Freezing, however, did increase toughness.

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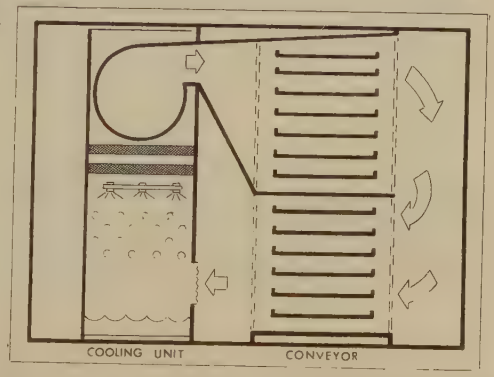
oxide film are sealed by the lacquer, the need for hot water sealing is also eliminated. After combined degreasing and anodizing takes place, the strip is rinsed and dried and the lacquer applied by a special machine. Combination of the anodizing and lacquering processes requires apparatus differing from that used for normal lacquering methods, because the lacquering rollers must automatically separate on passing joins in the strip. New open construction with powerful air circulation overcomes the problem of transmitting enough heat to the bare aluminum strip to carry out drying in a short time with exact temperature control and a minimum consumption of electricity. Use of a special lacquer developed for the combined process requires less time for this subsequent drying and polymerization of the lacquer in the electric oven. Improved lacquers for use in this process are constantly being developed and tested.

Relatively low resistance of pure aluminum to mechanical stresses during packing and transport has also caused some difficulties, particularly with the larger type of drawn can. In addition to developing special packaging methods to diminish this factor, a standard alloy was developed to provide greater resistance to mechanical stresses and strains. This F50S alloy, anodized and lacquered, results in a can nearly as mechanically strong as any competitive material. Exhaustive tests with a aluminum for packing foodstuffs have provided highly satisfactory results, and in many cases shelf life has been increased considerably beyond that achieved with materials formerly employed. In addition to improved resistance to chemical attack and increased economics of production, other advantages derived are light weight for ease and economy of transportation, and more attractive packaging. The shallow drawn aluminum can, anodized and lacquered, is now widely used in Scandinavia for packing fish. In fact, by far the greater proportion of the annual pack is in aluminum. The low cost of this anodizing and lacquering process may be expected to result in a wider use of aluminum cans in other parts of the world.

3.2341 (Cross Reference: 3.237)

passes across the top seven tiers of the moving conveyor trays to the opposite side of the tunnel where its direction is reversed and directed downward to return to the spray coolers across the lower six tiers. The air stream speed is only 12½ feet per second but the volume of air is large, 57,000 cubic feet per minute. The air temperature is -25° F. There is very little variation in temperature within the tunnel, even though 2,500 pounds of fish sticks per hour at 120° F. are constantly entering. This is because of the constant re-circulation of the large amount of chilled air.

The feature of this freezer that promotes such efficient use of refrigeration is the fact that frost never forms on the coils in which the refrigerant is evaporated. Frost is prevented from forming by a constant spray of an anti-freeze solution which removes the water from the returning air before it can be deposited on the coils.



3.237

up is about 5 percent in contrast to 10 to 12 percent when the deep fryer was in use. Moisture is retained and flavor is enhanced. Another important consideration is the lessening of fire hazard as large volumes of fat need no longer be heated. Production is at the rate ot 500 pounds per hour.

3.238 POULTRY BAGGING SPED BY AIR-SQUEEZE UNIT

Anonymous
Food Engineering 28, 101 (December 1956)

Bag characteristics. --A new transparent polyethylene bag that is shaped like the silhouette of a bullet eliminates heat shrinking and conventional vacuumizing operations in packaging eviscerated poultry. The new bag is handled on a specially developed closing machine. Six sizes of bags are made to fit turkeys from 4 to 8 pounds.

Within a few days after four new bag-closing machines were installed, a Butterfield, Minnesota plant turned out 3,000 Beltsville-fryer turkeys in 3 hours and 6 minutes. One newly hired operator was able to package 6 turkeys per minute after only 2 days of experience. Tests on the new round-bottomed bag reveal that it will stand temperatures as low as -90° F. without cracking, shattering, or tearing.

Plant operation. -- Workers in the plant place the birds in properly sized bags and drop them on a conveyor leading to the four packaging machines. Operators take bagged birds, and--without any preliminary vacuuming--insert the lips of the bags between rollers on the closing machine. Operation of each machine is similar to that of a washing machine wringer. The rotating rollers force the turkey down into the bag and the "piston action" of the bird displaces the air, which is then expelled from the package by the action of special grooves in the rollers (see illustration, over). These grooves allow the film in the neck of the bag to form air-escape channels. The packaging material stretches and forms the turkey into a compact shape after which the operator twists the neck of bag and seals it with a metal clip on a second machine. Excess plastic is trimmed from the bag neck, and the finished package is dropped on a conveyor that whisks it directly to the freezer. The process is adaptable to either a hock-first or a traditional breast first pack.

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 ABSTRACTER: Martin Heerdt

3.338 CANNING CONTAINERS - ENAMELS

Sturge, Ph. A.
La revue de la conserve 10, 126 (August-September 1955) (Paris)
World Fisheries Abstracts 7, 43-44 (September-October 1956)

For a canning lacquer, the main requirements are: (1) Adherence. The film of lacquer should adhere firmly to the tin plate. Lacquers with an oily base are excellent on a charcoal tin plate, but they are not so successful on an electrolytic tin plate. Synthetic lacquers adhere perfectly to both. (2) Continuity of the film. The lacquer should cover the metal evenly and have "setting" properties to make the spreading easier on the surface of the sheet without any retraction. The presence of grease should be avoided on tin plate before lacquering. (3) Resistance to embossing and making. Lacquer needs to be fitted to the type of can to be protected. For the embossed cans, both the metal and lacquer should have ductile properties. (4) Resistance to acids. For the maker, this problem is not difficult to solve, but to get a perfect film of lacquer, 2 layers are often necessary plus an additional coating over the seams after the can is finished. (5) Resistance to sulphur blackening. There are 2 possibilities; either to add to the lacquer a reagent neutralizing the sulphur by absorption, or to make the film of lacquer sulphur-proof. In the first case, zinc oxide is added to the lacquer and this produces a neutral white zinc sulphate and absorbs the sulphur from the food and the headspace, so avoiding blackening. Pigmented lacquers are not recommended for use with meat and fish because the film of pigmented lacquer becomes soft when heated and hard again when cooled. This makes solid foods stick to the can during the retort operation. For that reason, anti-sulphur, heat-hardening lacquers have been developed and they have proved to be very efficient.

Usually, heat-hardening lacquers are applied on the body of the cans, and pigmented lacquers on the bottom and top. (6) Resistance to burning during seaming. (7) Application and cooking. The

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 ABSTRACTER: Jacques Chaux

3.249 COLD STORAGE LIFE OF FRESH-WATER FISH -- NO. 3.

Osterhaug, Kathryn L. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 18, 16-18 (November 1956)

In this paper, the results of cold-storage tests on three fresh-water species (lake herring, Leucichthys artedi; northern pike, Esox lucius; and whitefish, Coregonus clupeaformis), are reported.

The northern pike, which were shipped iced and then filleted before being frozen, remained acceptable through 6 months of frozen storage at 0° F. By 9 months, the meat had darkened somewhat and moderate to strong rancidity had developed.

The whitefish were found to be acceptable through 9 months of storage. By 12 months, all of the samples had darkened in color and were slightly to moderately rancid.

The lake herring that had been frozen and stored in the round were judged not to be acceptable at the seventh-month examination, owing to discoloration and autolytic breakdown in the belly cavity. The meat along the belly flaps was strongly mottled from gray to brownish red, with yellowish spots near the nape. There was also a strong tendency for the rib bones to protrude into the belly cavity. Strong "muddy" or "scorched" off-flavors were noted. After 9 months of storage these samples were also rancid.

The lake herring that had been scaled, headed, and gutted before being frozen remained "acceptable" through the ninth-month examination, but they were judged "not acceptable" at 11 months, owing to the development of rancidity. These fish might have had a longer frozen-storage life if the original cleaning of the belly cavity had been more thorough.

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 ABSTRACTER: Kathryn L. Osterhaug

3.6 DETERIORATION OF DEHYDRATED MEAT DURING STORAGE

Sharp, J. G.
Journal of the Science of Food and Agriculture 8, 14-25 (January 1957)

I. Non-enzymic deterioration in absence of oxygen at tropical temperatures. --Deterioration in the quality of dehydrated precooked pork, which takes place during storage even in the absence of oxygen, appears to be due to a typical carbonyl-amino browning reaction. The effect of moisture and temperature on this reaction have been studied by the author.

In pork, the reactive sugar fraction consists mainly of free glucose and glucose-6-phosphate. The sugar fraction was found to react with either the protein fraction or the non-protein soluble fraction, and to produce a brown discoloration. The characteristic bitter, burnt flavors of stored dehydrated pork, however, are produced only by the reaction of the sugar fraction with the non-protein fraction.

The carbonyl-amino browning reaction can be inhibited entirely if the pork is stored under nitrogen containing 500 parts per million of sulphur dioxide, or if the pork reducing sugars and glucose-6-phosphate are removed by fermentation with high concentrations of yeast. Partial inhibition of the carbonyl-amino browning reaction can be obtained by fermentation of the free sugars only with low concentrations of yeast or by oxidation of the free glucose only with glucose oxidase.

II. Effect of pH and temperature on browning changes in dehydrated aqueous extracts. -- Typical browning reactions occur in dehydrated protein-free aqueous extracts of pork during storage under nitrogen. These reactions result in the loss of free reducing sugar and the development of brown discoloration and unpalatable burnt flavors. The rate of development of the brown discoloration at

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 ABSTRACTER: Martin Heerdt

POULTRY BAGGING UNIT

FREEZING FRESH-WATER FISH

TYPES OF CAN ENAMEL

DETERIORATION OF DEHYDRATED MEAT

3.249 (Cross Reference: 1.92)

Frozen fillets of lake herring remained acceptable through the seventh-month examination, but by the ninth-month examination they had become spongy in texture and somewhat rancid throughout.

Frozen breaded fillets of lake herring remained acceptable through 7 months of storage. No further storage was possible because, at that time, the samples were used up.

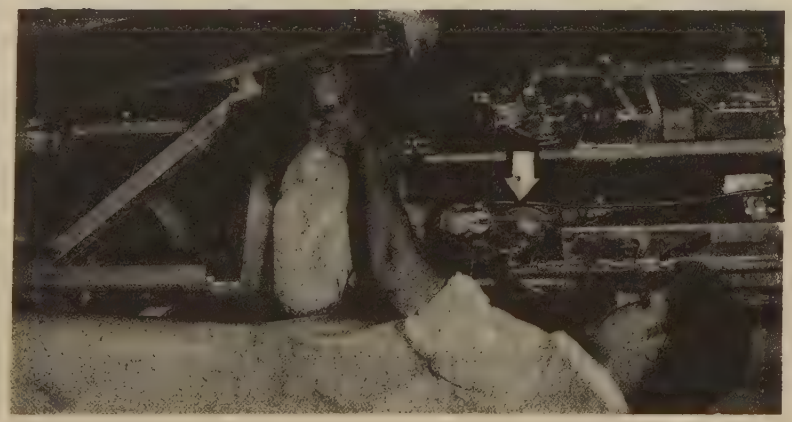
3.6

37° C. increases with an increase in pH over the range pH 3 to 7.

The calculated temperature coefficient, Q_{10}, values of the rate of loss of free fermentable sugar and the rate of development of brown discoloration varied between a low of 3.2 and high of 4.3 and were similar in the temperature range 15° to 50° C.

The dehydrated protein-free aqueous extracts of pork declined steadily in pH by 0.3 to 0.7 of a pH unit during the first 6 months of storage. When stored at 15° to 37° C. the extracts of pork increased in fluorescence rapidly to a maximum and then decreased steadily. At a storage temperature of 50° C. the extracts of pork, after an initial increase and decrease in fluorescence, increased again after 97 days of storage.

3.238



Grooved rollers squeeze out air and stretch film in new polyethylene bag-package for frozen, eviscerated poultry. After bag neck is twisted, it is clipped and trimmed on second unit (arrow).

3.338

rollers of the lacquering machine can be made of gelatin or synthetic rubber and they should not be attacked by the lacquer. The viscosity of the lacquer should be adapted to the type of the machine so as to apply the right thickness; facilities for leaving some parts free from lacquer, e.g., the seams, should also be available.

Some lacquers can be cooked at relatively low temperatures for long periods or high temperatures for shorter periods. For certain lacquers, there is a very high temperature to complete polymerization; this is called heat-hardening.

3.5 SALTING THEORY AND PRINCIPLES

Omland, D.
Fiskets Gang 41, No. 38, 495 (September 22, 1955) (Bergen, Norway)
World Fisheries Abstracts 7, 35-36 (September-October 1956)

The equilibrium process of salt in fish and brine has been explained. Due to osmotic pressure, the water will flow out of the fish tissue, and the salt will diffuse into the fish tissue. A protein-salt complex is established, which will again have a higher osmotic pressure than the brine and brine will flow into the fish tissue. These phenomena can be observed in the salted fish. After a few days, the salted fish are dry, but as the process proceeds, the fish get more "round."

The curing process has been ascribed to the autolytic enzymes. Microorganisms do not take part in the actual curing process, but the presence of bacteria is necessary if the product is to get agreeable smell and taste.

Sterile pieces of herring flesh have been cured in sterile salt solutions of 20, 10 and 5% NaCl for 6 months, and acquired a cured consistency, but the typical taste of a cured product was absent.

From a technological point of view, the curing process is normally ascribed to the breakdown of proteins to peptides and amino acids. Recent experiments seem to point in another direction. Qualitative chromatographic analysis of the de-salted brine showed no variation in the available free amino acids. The amount of free amino acids increased until the 20th or 25th day of salting. Prolonged curing gave no further increase of available free amino acids. "Water-soluble" protein increased until the 25th day. A decrease was then observed until the 50th day, whereafter a constant amount was present. The NH_3 (and total N) was the only nitrogen compound which increased all the time during storage.

(over)

ABSTRACTER: Rolv Vesterhus

3.63 THIS UNIT PUTS FREEZE-DRYING RIGHT ON THE PROCESSING LINE

Anonymous
(McGraw-Hill World News, London, England)
Food Engineering 28, 40-41, 143 (November 1956)

Fish steaks, chops, fruits, and vegetables are now being freeze dried with a high degree of flavor retention in a commercial plant at Aberdeen, Scotland.

First Step in this new low-temperature process is batch freezing of the item to be dehydrated, in this case, steak . . .

Processing. -- The first step in the drying process is batch freezing of the food to uniform thickness on trays under pressure in a plate freezer, shown at right. When frozen, the food is removed from the freezer and placed on metal contact plates which have internal passages. These plates go into the racks of a rail-riding car which, when loaded, holds 18 contact plates full of food, each of which measures about 2½ by 5 feet. The loaded car is then rolled into a steel-cabinet vacuum-dryer equipped with an expansion tank (A), jet condenser (B), water ejector (C), and condensate pump (D), as shown (see over). Pressure, which is applied evenly through each plate during drying, is controlled by external valves which also open and close the plates. The hydraulic mechanism for the plates is located inside the vacuum chamber. Temperature is controlled by pumping hot water from a heat exchanger through the internal passages of the plates during the drying cycle and cold water through the plates for final cooling. During drying the pressure in the cabinet is reduced to 0.21 pounds per square inch by a steam ejector that removes

(over)

ABSTRACTER: Martin Heerdt

3.6 FREEZE-DRIED MEAT

Regier, L. W. and Tappel, A. L. (University of California, Davis)
Food Research 21, 630-649 (November-December 1956)

III. Non-oxidative deterioration of freeze-dried beef. -- Physical and chemical measurements made on samples stored in nitrogen atmospheres at controlled temperatures and controlled moisture contents were used to characterize the non-oxidative deterioration of freeze-dried beef. Deterioration was characterized by the following changes:

(1) An increase in reducing compounds.
(2) An increase in fluorescence.
(3) A decrease in free amino groups.
(4) A decrease in soluble total, non-protein and protein nitrogen.
(5) A decrease in the solubility of hematin pigments.
(6) A decrease in papain digestibility.
(7) A decrease in free glucose and mannose.
(8) A decrease in rehydration capacity.
(9) A color change from light pink to brown to yellow brown.

All of the above changes were good criteria of active carbonyl-amine browning, which the authors concluded is the main and probably the only significant non-oxidative deteriorative reaction in freeze-dried meat. The protein nutritive value of freeze-dried meat remained unchanged even after it had been rendered organoleptically unacceptable by non-oxidative deterioration.

IV. Factors affecting the rate of deterioration. -- The apparent activation energy required for the

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ABSTRACTER: Martin Heerdt

4.13 THE PHOSPHOLIPIDS OF FISH

Lovern, J. A.
Journal of the Science of Food and Agriculture 7, 729-733 (December 1956)

The component phospholipids of the flesh of cod and haddock show a general similarity. A complex mixture of phospholipids is present in which lecithins comprise 50 to 60 percent of the total. There is also a group of unidentified phospholipids, temporarily named A, B, and C, with A greatly predominating. Lipids A and C may be derivatives of a bisphosphatidic acid. Three types of inositol phosphatides have been detected. Phosphatidyl-ethanolamine is a minor component. Traces of plasmalogens were detected. Phosphatidyl-serine was absent.

Phospholipid-A contained an unusually high proportion of stearic acid, whereas phospholipid-B was virtually devoid of C_{22} acids. The fatty acids of phospholipid-C resemble those of the lecithins. The fatty acids of the lecithins are remarkable for their high proportion of C_{20} and C_{22} polyethylenic acids and for the virtual absence of hexadecenoic acid.

In table 1 is shown the results of the phospholipid analyses. Table 2 shows the results of the analysis of fatty acids from haddock-flesh phospholipids.

See tables, over.

(over)

ABSTRACTER: Edward H. Gruger, Jr.

CURING HERRING

CARBONYL-AMINE BROWNING

FREEZE DRYING OF FISH

FISH PHOSPHOLIPIDS

3.6

deterioration of freeze-dried beef during storage is 25 kilogram-calories per mole. This value supports the conclusion that browning is the major deteriorative reaction and eliminates the possibility of a significant amount of thermal denaturation during browning.

The limiting reactants in the browning of freeze-dried beef are the carbonyl compounds. A decrease in the pH of freeze-dried beef decreases the rate of non-oxidative deterioration. Volatile compounds that are produced during the deterioration of freeze-dried beef do not appear to enter into other reactions. These volatile compounds probably are end products or side products of the deterioration.

Deterioration of freeze-dried beef during storage cannot be eliminated even by essentially complete removal of water. The moisture level of the product, therefore, is very important to storage stability, because the rate of deterioration increases with an increase in moisture content.

Methods for increasing the storage life of freeze-dried beef are presented and discussed by the authors.

3.5

It is concluded that the curing process is a result of an enzymatic change of the protein via denaturation by salt. It is even suggested that the curing may proceed without salt if any other denaturating agent were present.

No account as to the development of smell and taste has been given.

4.13

Table 1.--Phospholipids of the flesh of cod and haddock, as percent of total phospholipids

Fish	Lecithin	Phosphatidyl ethanolamine [a/]	Inositol phosphatides	Plasmalogens	Novel phospholipids
Cod	54	11	3	Present	32
Haddock	62	8	6	2	22

[a/] No phosphatidyl-serine present.

Table 2.--Composition of the fatty acids of some phospholipids of haddock flesh, as weight percent

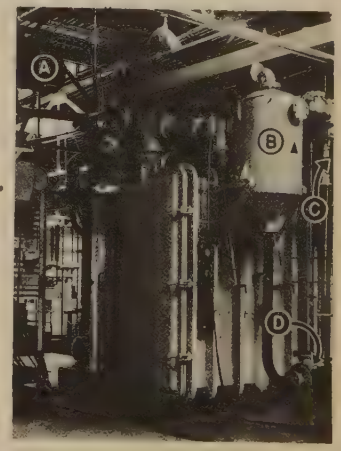
Lipid	Saturated acids			Unsaturated acids		
	C_{16}	C_{18}	C_{20}	C_{18}	C_{20}	C_{22}
Acetone-soluble lecithins	15	5	2	9	38	31
Acetone-insoluble lecithins	22	8	1	19	32	18
Total lecithins	18	7	2	14	35	24
Lipid-A	6	18	2	8	42	24
Lipid-B	16	5	6	28	45	--
Lipid-C	8	7	6	16	45	18

3.63

air, evaporated moisture, and non-condensables through a jet condenser at the rear of the cabinet.

A charge of 700 pounds of wet fish can be freeze-dried in about 6 hours to a final moisture content of approximately 5 percent. Moisture in the frozen product is converted directly to water vapor. The drying temperature is low enough to minimize protein denaturation.

Freeze-dried foods, gas packed in cans, can be stored in the tropics without refrigeration for up to 6 months without loss of quality. They require soaking in water for only a short time to restore them to their original flavor, consistency, and food value.



COMPACT FREEZE DRYER operates at 0.21 psia., handles 700-lb. charge in about 6 hr. Foods placed on metal contact plates go into racks of rail-riding car (partially visible at left). Then plates are loaded into the vacuum dryer. Unit's accessories include: Expansion tank (A), jet condenser (B), water ejector (C), and condensate pump (D).

4.62 CHEMIST TAKES AN OBJECTIVE LOOK AT ANTIOXIDANTS

Rose, C. B. (Darling and Co., Chicago, Illinois)
The National Provisioner 135, 29, 31, 41 (October 20, 1956)

The following are the properties to be desired in an all-around antioxidant:

1. It should be non-toxic to the renderer using it and to the animal consuming it. The consuming animal should either destroy the antioxidant in digestion or discharge it as waste and should not store it as a component of its own fat.

2. It should be readily mixable and soluble in fat at temperatures of 120° to 140°F. Many products offer only mediocre satisfaction here.

3. It should be in such form as to be easily stored, handled, measured and added to the fat.

4. It should be a fully self-contained product so that it is not necessary to add various combinations of special additives. A "shot gun" treatment that has a good batting average is more desirable than to try to tailor the selection of antioxidants to meet a specific grade or specific applications.

5. It should be specifically fat soluble rather than partly fat and partly water soluble. This would solve one of the most vexing problems the renderer has in connection with feed makers who use fat, namely, washing out the antioxidant through condensation or water contamination in storage or process tanks.

6. It should be non-volatile and non-reactive to materials so that heating, drying and stripping will not remove it from the fat. This characteristic also guarantees retention of its activity in the fat

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Reprinted in part

6.138 FUNGICIDAL PROPERTIES OF MODIFIED UNSATURATED FISH OILS

Anonymous
Commercial Fisheries Review 18, 19 (November 1956)

A comparison was made between the fungicidal activity of a modified unsaturated fish oil and inorganic copper salts. The fish oil was found to be approximately 32 times as effective as the copper salts in preventing mold development. The inorganic salts studied were copper sulfate and basic copper acetate; the fish oil was modified by chemically uniting it with a quaternary ammonium compound.

The comparative amounts of mold (Candida albicans) growth in cultures containing the above salts and in those containing modified fish oils were studied. The culture containing approximately 0.0009 ounce of modified unsaturated fish oil per gallon showed no evidence of mold growth, whereas those containing much larger quantities of the two copper salts were quickly overgrown with mold. Further studies are continuing.

Research on the nematocidal characteristics of fish oils is now out of the laboratory and into the pilot-study phase. Problems of application of the nematocidal fish oils to nematodes in the underground roots of citrus trees are being studied.

COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug

6.135 THE ODOR PROBLEM

Josleyn, H. Nye
The National Provisioner 135, 12-14, 19 (December 29, 1956)

Much can be done to control offensive odors. Principles involved include (1) reodorization or perfuming, (2) counteraction, (3) cleanliness, (4) water washing, and (5) improved operation of equipment.

Certain pairs of odors mixed in appropriate concentrations have been found to be antagonistic to one another so that the significant odor is cancelled out or much diminished. True counteraction of odors leaves no overriding smell of any kind.

Since most smells about a plant originate from processing, unclean conditions, or accumulated waste, the most direct and practical method of elimination is to strike at the source. Good housekeeping to eliminate offensive odors requires rigid controls.

Water used in certain specified ways is frequently successful in combating the heavy odors of closed cookers or the more widespread smells encountered in free air. Atmospheric condensers and water-sealed vacuum pumps are used for vented tank service in many packing plants. Air washing and scrubbing have proved satisfactory in many instances.

Simple jet condensers can be used in any plant to remove concentrated odors where a deep vacuum is not required. Such a condenser consists of an enlarged tail pipe with enough water sprayed into the top to give increased air velocity and turbulence. When designed for vacuum cooking, this style of condenser must be 34 feet in height. Commercially made condensers may be purchased for special needs.

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Kathryn L. Osterhaug

6.192 THE INFLUENCE OF DIETARY CAROTENE ON THE MORTALITY PATTERN OF FOWL WITH SOME OBSERVATIONS ON THE INFLUENCE OF CONDENSED FISH SOLUBLES

Coles, R.; Gordon, R. F.; Chubb, L. G.; and Cumber, F.
Journal of the Science of Food and Agriculture 7, 692-699 (November 1956)

There are many cases on record where the liver of chickens that have died from fowl paralysis and avian leucosis has contained amounts of vitamin A considerably below normal. A low level of dietary vitamin A is believed to promote increased mortality from these diseases.

Purpose. -- A study was made, therefore, to learn if the incidence of mortality from avitaminosis-A and the depression in egg production was due to the feeding of vitamin-A-deficient rations to laying chickens. Chickens known to be susceptible to fowl paralysis and avian leucosis and in which the death rate from these diseases was high were used.

Findings. -- Neither high nor low levels of carotene in the rations had any consistent effect on the incidence of fowl paralysis or avian leucosis. If the death rate from these diseases was high, mortality from avitaminosis-A had a tendency to occur earlier in the life of the chickens than it would ordinarily occur. With low levels of carotene, such as 500 international units of vitamin A per pound of feed, normal annual egg production was delayed by 4 to 6 weeks at both the beginning of production and at the autumn peak. Egg production did not show an obvious decline until 4 to 5 months after beginning the feeding of the deficient ration. In commercial practice without controls, however, the initial delay in production resulting from the feeding of a diet deficient in vitamin A would be difficult to distinguish from a delay caused by genetic reasons. A dietary vitamin A deficiency would probably be even more difficult to diagnose if the stock were not intensively housed.

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COMMERCIAL FISHERIES ABSTRACTS VOL. X. NO. 5 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

ANTIOXIDANTS FOR FEEDING OILS

PROCESSING PLANT ODORS

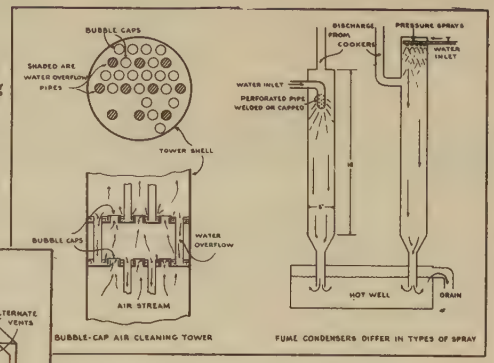
FISH OIL AS FUNGICIDE

FISH SOLUBLES AND CAROTENE LOSS

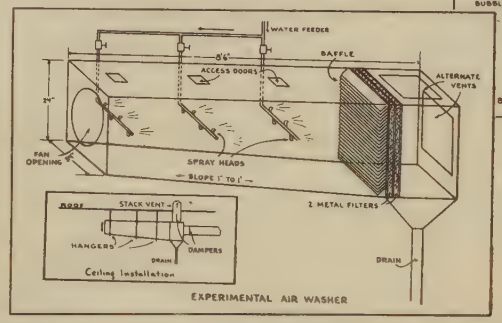
6.135 (Cross Reference: 3.18)

Bubble towers in which the contaminated air is bubbled up through the liquid are used to remove odors that have a comparatively strong resistance to absorption by water. Other systems of upright cylinders filled with broken stone, coke, ceramic rings and like material are similarly utilized.

Besides water scrubbing, other ways of treating odor-contaminated air are used either alone or in combination with water washing.



Different ways of using water for washing and scrubbing.



An experimental air washer which has been employed satisfactorily in a rendering room.

6.192

A death rate of significant importance will occur with diets having low levels of vitamin A, but an appreciable degree of mortality from avitaminosis-A is not likely until after the development of a decline in egg production. The greatest incidence of mortality from avitaminosis-A occurs 5 or 6 months after beginning the feeding of the deficient diet, but it may occur as much as 7 to 9 months after feeding is begun.

Carotene was eventually destroyed by the addition of condensed fish solubles to the diet. In high-carotene diets the destruction of carotene had no effect on egg production or mortality from avitaminosis-A, but in low-carotene diets it led to an earlier decline in egg production and a very high rate of mortality from avitaminosis-A. The addition of fish solubles as a useful source of the animal protein factor (A. P. F.) complex, therefore, appears to be inadvisable unless the rations have a normal to high level of vitamin A.

The authors suggest that the destruction of carotene in the presence of animal protein is possibly due to some water-soluble component, and that this component may be a factor in the A. P. F. complex other than vitamin B_{12}.

4.62

in storage and use. Present antioxidants are only partially successful in fulfilling this need.

7. It should be readily and simply detectable, both qualitatively and quantitatively, so that its presence can be checked in "trouble shooting" customer problems. Production control and customer service would be substantially better if a quick analytical method of determination were available. Even an inert, easily-measured, tell-tale additive would help.

8. It should be lower in cost so it can be used for all fats, whether for feeds or not.

9. It should present no complications in use for other pruposes so that surplus stabilized fat can be inventoried and employed either for purposes where stability is necessary or other industrial uses.

10. It should be of such a nature that its antioxidant properties in the finished feeding fat can be measured or evaluated by some method much faster than the present 20-hour A. O. M. method. Some accelerated method, with determination consuming not over 30 minutes, is needed to expedite guaranteed production and reduce customer irritation due to delay.

None of the current commercially available antioxidants has all the desired properties and some fall far short. In any event, the feed fat producer is automatically limited to antioxidants having USDA approval.

The list of approved materials is limited to those antioxidants containing one or more of the products, butylated hydroxyanisole, butylated hydroxytoluene and propyl gallate. Ethoxydihydrotrimethylquinolin (trade name Santoquin) has been approved only for use in poultry feeds at the present time.

Approval also includes the use of certain materials such as citric acid and phosphoric acid, or some of their esters, which act as metal scavengers to protect the effectiveness of the antioxidants against the presence of metals such as iron and copper.

In making this antioxidant selection the feed fat manufacturer should consider several factors. First, only the active antioxidant represents real value and the addition of solvents or diluents serves only to make application easier and their cost represents direct expense without compensating stability. Second, the A. O. M. stability efficiency of each commercial product must be compared over a number of batches to determine how each product stands in effective stabilization action. Three, the total cost of the antioxidant used must be considered, which includes its cost, that of any additives, the labor cost of preparation and addition, the cost of the equipment needed, etc. Four, the level or type of protection the feed fat consumer wants must also be considered.

6.138

6.195 ESSENTIAL AMINO ACID CONTENT OF FARM FEEDS

Lyman, Carl M.; Kuiken, K. A.; and Hale, Fred (Texas Agricultural Experiment Station, College Station, Texas)
Journal of Agricultural and Food Chemistry 4, 1008-1013 (December 1956)

One hundred and fifteen different feed ingredients and related products were analyzed for each of the 10 essential amino acids. Classes of material analyzed included algae, animal byproducts, fermentation feeds, grains, grain byproducts, oilseed residues, peas, beans, and fish byproducts. Microbiological procedures were used for the amino acid assays.

In many cases a number of samples of the same material were analyzed, but to save space only data on the sample that appeared to be most typical and representative of the products are included in the table.

The data on fishery byproducts are reprinted here.

See table, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

6.84 HOW PEARL ESSENCE IS MADE

Anonymous
Fisheries Newsletter (Australia) 16, 21, 29 (January 1957)

"Pearl essence" is prepared from the lustrous, iridescent material that occurs on the skin or scales of certain species of fish. It is used as an ingredient of a type of lacquer that imparts the pearly lustre to imitation pearls and is also used in the manufacture of certain types of costume jewelry and toilet articles.

The lustrous material on the skin and scales of these fish consists mainly of a thin deposit of the chemical guanine which, when suitably separated from the scales and agitated with a liquid, breaks down into minute glittering crystals.

The pearl essence industry flourished in Japan from 1920 until 1930 when the demand dropped for imported pearl essence in the United States. Production in the United States has recently been encouraged by the development of new plastics in which iridescence is desired.

In Japan, a bamboo knife was employed to scrape off the nacreous material from the skin, or to scrape off the scales. The wet mass was agitated with benzene which has the property of preferentially wetting the small crystals of guanine and placing them in suspension. Four successive agitations of the material with fresh quantities of benzene were used to complete the extraction. Any water present separated into a lower layer and was separated from the benzene layer.

The guanine crystals gradually settled out of the benzene suspension. The benzene was removed and the crystalline mass allowed to stand while the residual benzene evaporated.

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 ABSTRACTER: Kathryn L. Osterhaug

6.55 PROCESSING OF COD AND HADDOCK VISCERA:
1. LABORATORY EXPERIMENTS

Freeman, H. C. and Hoogland, P. L. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 13, 869-877 (November 1956)

Commercial cod and haddock fishermen discard about 16¾ percent of each fish caught. This discarded material, which consists of guts and stomach, is called viscera or total viscera without livers. The approximate composition of this raw viscera is 80 percent water, 10 to 12 percent protein, 1 to 2 percent fat, and 2 to 3 percent ash. In addition it contains various B vitamins and unidentified growth factors.

Purpose. --The present paper describes laboratory experiments that were used to establish a suitable method of processing viscera obtained from cod and haddock that are less than 24 hours out of water.

Digestion with enzymes. -- Two hundred grams of water and various proteolytic enzyme preparations were added to each 250 gram sample of fresh viscera. These mixtures, after they had been adjusted in pH with acid or alkali, were held at 25°, 37°, or 50° C. for two weeks. Samples of the mixtures were withdrawn at intervals, filtered, and washed. The solids contents of the filtrates were determined, and the amount of soluble solids were expressed as a percentage of the total solids in the original sample. This percentage ratio was used to indicate the extent of digestion.

Results. -- The addition of enzymes to the viscera offered no advantages, since natural enzymes apparently were available in the raw material. Consequently, the rate of digestion and the maximum effect from digestion were practically identical with all of the autolytic treatments. At 37° C., autolysis progressed rapidly; at 25° C., autolysis progressed somewhat less rapidly; and at 15° C.,

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 ABSTRACTER: Martin Heerdt

7.53 ACETONE-WATER MIXTURES FOR THE EXTRACTION AND RAPID ESTIMATION OF FATS OF BIOLOGICAL MATERIALS, PARTICULARLY FISH PRODUCTS

Dambergs, N. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 13, 791-797 (November 1956)

According to Stansby (1953), acetone that contains added water, mineral acids, or organic acids extracts more fat from fish meals than does pure acetone.

Purpose. -- This paper reports on an investigation that was made to determine the possibility of using acetone without and with added water to extract fats from fish products. Harrison (1938) and 1942) showed that acetone was more efficient as a fat solvent than methanol, ethanol, or isopropanol; that refluxing with acetone gave better results than continuous extraction; and that the water content of the acetone was important in fat extraction.

Procedure. --If fish meals are extracted, solvent number 1 is dry acetone, and solvent number 2 is acetone with 30 ± 5 percent water. If fresh fish or samples with more than 10 percent water are extracted, solvent number 1 is acetone with enough added water to constitute 20 to 30 percent of the liquid phase, and solvent number 2 is dry acetone. A sample having about 0.5 grams of fat, which usually would consist of 3 to 5 grams of fish meal or 5 to 25 grams of fresh tissue, is weighed into a 250 milliliter (ml.) Erlenmeyer flask. Fifty ml. of the first solvent is added plus 10 ml. of this solvent for every additional gram of dry sample over a minimum of 5 grams; and the mixture is refluxed for 30 minutes. The refluxed mixture is filtered through a medium or coarse sintered glass filter with suction into a 125-ml. suction flask. The residue in the boiling flask and the flask itself are washed with about 30 ml. of the first solvent in small portions, after which the residue is returned

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 ABSTRACTER: Martin Heerdt

AMINO ACIDS IN BYPRODUCTS

ENZYME DIGESTED VISCERA MEAL

PEARL ESSENCE

EXTRACTION OF FISH FATS

6.55

autolysis progressed very slowly. In the range pH 1 to 8, pH appeared to have little if any effect on the rate of autolysis. However, autolysis at pH 6.5 to 7.5 produced very offensive spoilage odors. At pH 3 this spoilage did not occur, but the autolysates required neutralization before they were dried. As a consequence, the dried products contained large amounts of salt. Two preservatives, sodium nitrite and methyl parahydroxybenzoate (methyl parasept), were studied for their ability to inhibit spoilage and yet permit autolysis when added to fresh raw viscera.

Prevention of spoilage of the viscera.--To each 250 gram portion of frozen viscera the authors added sodium nitrite or methyl parasept. These samples were incubated at 37° C. for two weeks and inspected daily for spoilage. Methyl parasept, in concentrations up to 1 gram per 500 grams of raw material, did not postpone spoilage satisfactorily. Sodium nitrite, however, was effective in prolonging the keeping time of viscera; and its effectiveness was greater at pH 5.5 than at pH 6.8. At least 0.1 percent sodium nitrite was required at either pH to prevent spoilage of the viscera for two weeks during autolysis. During autolysis, sodium nitrite diminished steadily from 0.1 percent to about 0.04 percent in three days.

Drying of autolysates.--Good final products were obtained by vacuum drying, spray drying, and drum drying; however, drum drying was the most acceptable method because it was considerably lower in cost. Seven different autolysates were drum-dried in all. On analysis their nitrite contents were found to vary from 0.02 to 0.056 percent on a moisture-containing basis before drying. After the seven autolysates had been dried, their meals contained 0.0011, 0.0046, 0.0052, 0.0063, 0.0082, 0.0126, and 0.0184 percent sodium nitrite, respectively. This amount of sodium nitrite was considered acceptable for preparations intended for use as additives in animal feeds. Analysis showed that the finished meals were good sources of nitrogen and B vitamins. Pilot plant scale production costs will be determined.

7.53

to the boiling flask and refluxed with the same volume of the second solvent.

The first extract in the suction flask is evaporated to apparent dryness on a hot plate in a slow current of air, while the second extraction is in progress. Fat from the first crude extract is dissolved in 30 ml. of ether, added in four to six portions. Portions of ethereal solution are decanted into a tared, 50 ml. beaker. The second extract is treated and taken up in like manner, but the ethereal solution from it is combined with that from the first extract. The combined solutions are evaporated in a current of warm air, and the fat is weighed after repeated drying to a constant weight.

Effect of water content of acetone on fat extraction.--Five-gram samples of cod meal were extracted in two successive 4-hour refluxings, each with 100 ml. of acetone-water solvent, which contained from 0 to 50 percent water, volume for volume. The weights of crude extract and fat were determined after each refluxing. Maximum amounts of fat were obtained with acetone containing 20 to 30 percent water. As the water content of the solvent was reduced to 3 percent water, the fat yield decreased to a minimum and then rose again, whereas the yield of crude extract increased with increasing water content. Extracts obtained with acetone containing more than 40 percent water were difficult to filter, and contained protein. This experiment was repeated with 25-gram samples of fresh cod, and the results on a moisture-free basis were identical with those obtained with the dry cod meal.

Efficiency of successive extractions of lean and fatty fish meals.--Cod meal extracted with acetone containing 10 to 30 percent water yielded 94 to 97 percent of the total fat in the first extraction, and 98 to 101 percent of the total after the second extraction. With herring meals, these values were 91.4 to 87.6 and 97.6 to 99.6 percent, respectively. With cod meals, two 30-minute refluxings were needed to obtain all of the fat available; whereas with fresh fish, two 15-minute refluxings were adequate.

Extraction with dry acetone as well as wet acetone.--Total fat yields of 100 percent were obtained with cod and herring meals if dry acetone was used as the first solvent for extraction and acetone with 30 percent water as the second solvent. Fresh cod and fresh herring that were extracted with acetone containing 30 percent water as the first solvent and dry acetone as the second solvent yielded better than 98 percent of the total fat content.

6.195

Table 2. Amino Acid Content of Farm Feeds

Fish Byproducts	Crude Protein g. per 100 g. Product	Arginine %		Histidine %		Isoleucine %		Leucine %		Lysine %	
		Sample	Crude protein	Sample	Crude protein	Sample	Crude protein	Sample	Crude protein	Sample	Crude protein
Crab bran	40.05	2.21	5.52	0.80	2.00	1.75	4.37	2.59	6.47	1.85	4.62
Fish press water	59.72	2.17	3.63	2.02	3.38	0.99	1.66	1.87	3.13	2.40	4.02
Herring meal	72.25	4.13	5.72	1.71	2.37	4.15	5.74	5.89	8.15	5.92	8.19
Perch meal	58.42	3.64	6.23	1.14	1.95	2.69	4.60	4.08	6.98	4.39	7.52
Sardine meal	68.25	4.02	5.89	1.80	2.64	3.48	5.10	5.33	7.81	5.86	8.58
Shrimp bran	33.44	1.79	5.35	0.67	2.00	1.23	3.68	1.97	5.89	1.48	4.42
Shrimp meal	42.28	2.25	5.32	1.70	1.66	1.58	3.74	2.27	5.37	2.02	4.78
Whale meal	53.02	2.50	4.72	1.19	2.24	2.73	5.15	4.29	8.09	3.49	6.56
White fish meal	67.38	4.38	6.50	1.24	1.84	2.78	4.12	4.48	6.65	4.57	6.78

Fish Byproducts	Methionine %		Phenylalanine %		Threonine %		Tryptophan %		Valine %	
	Sample	Crude protein	Sample	Crude protein	Sample	Crude protein	Sample	Crude protein	Sample	Crude protein
Crab bran	0.73	1.82	1.70	4.25	1.54	3.84	0.45	1.12	2.00	4.99
Fish press water	0.80	1.34	0.96	1.61	0.10	0.167	0.17	0.28		
Herring meal	2.11	2.92	2.92	4.04	3.26	4.51	1.12	1.55	4.37	6.05
Perch meal	1.61	2.76	2.22	3.80	2.46	4.21	0.70	1.20	2.56	4.38
Sardine meal	2.04	2.99	2.92	4.28	3.04	4.45	0.89	1.30	4.07	5.96
Shrimp bran	0.62	1.85	1.33	3.98	1.34	4.01	0.37	1.11	1.62	4.84
Shrimp meal	0.72	1.70	1.55	3.66	1.47	3.48	0.39	0.92	1.98	4.68
Whale meal	1.01	1.90	2.07	3.90	1.64	3.09	0.82	1.55	2.82	5.32
White fish meal	1.75	2.60	2.26	3.35	2.76	4.10	0.68	1.01	3.03	4.50

6.84

After all but a small residual portion of the benzene had evaporated, methyl or ethyl alcohol was added and well mixed with the mass of crystals. The alcohol removed most of the remaining water. An additional wash with acetone removed the final traces of water.

After the acetone had largely evaporated, amyl acetate was added to the crystals and agitated. The crystals were then allowed to settle and the solvent decanted off. One part by weight of crystals slightly moist with amyl acetate, one part of celluloid, and 60 parts of amyl acetate were then mixed until the celluloid had dissolved. The celluloid increased the viscosity of the solution to a point where the different size guanine crystals settled at a rate that was sufficiently slow to allow their separation of several grades of fineness, each having different degrees of lustre.

The preparation of the final product, the pearl essence of commerce, involves the incorporation of the last suspension with various substances such as lacquer or varnish, and constitutes an art varying with each manufacturer according to the use for which the product is designed.

7.81 A RAPID VACUUM DISTILLATION PROCEDURE FOR THE DETERMINATION OF VOLATILE ACIDS AND VOLATILE BASES IN FISH FLESH

Tomiyama, Tetuo; da Costa, Antonio A.; and Stern, Joseph A.
Food Technology 10, 614-617 (December 1956)

Purpose. -- The authors have further modified the vacuum distillation method of the AOAC so that it is suitable for determining both volatile acids and volatile bases. The primary advantages of the new method are (1) the rapidity with which determinations can be carried out, (2) the short time and simple operation needed for cleaning the apparatus between determinations, and (3) the preparation of a single, stable extract of flesh for use in both determinations.

Preparation of sample. --Eighty-five grams of the comminuted flesh and 200 ml. of water are homogenized in a blender-top for 3 minutes. Then 200 grams of the homogenate is transferred into a large flask along with 400 ml. of an acid $MgSO_4$-solution, and the two materials are shaken together and then filtered. Fifty ml. of this filtrate is equivalent to 5.0 grams of flesh.

Apparatus. --The vacuum distillation apparatus used is diagrammed with descriptive lettering on this card (see over).

Procedure with bases. -- The stopcocks U and Y and the pinchcock Z in the diagram are closed, aspirator pump D is started, and the vacuum is adjusted to 29 inches of mercury by regulating stopcock O. Receiving vessel L is made ready and attached to the system. For the determination of volatile bases, 10 ml. of 1/28 Normal sulfuric acid is placed in the receiving vessel, and 50 ml. of the sample solution is added to the distilling flask via stopcock X and funnel B. Next, 5 ml. of 10 percent sodium hydroxide are added to flask A, and distillation is initiated by closing stopcock X and slowly

(over)

ABSTRACTER: Martin Heerdt

8.8 CORRELATION OF pH AND QUALITY OF SHUCKED SOUTHERN OYSTERS

Gardner, E. A. and Watts, B. M. (Department of Food and Nutrition, Florida State University, Tallahassee)
Commercial Fisheries Review 18, 8-15 (November 1956)

The spoilage pattern of refrigerated Southern oysters was found to be similar to the spoilage pattern of oysters from other areas. This type of spoilage is fermentative in nature and is characterized by a gradual and continuous decrease in pH accompanied by the development of a sour odor.

A number of investigators have studied the relationship between the pH and the quality or freshness of oysters. In none of the studies, however, was any mention found either of the mechanisms that might be responsible for the souring or any identification made of the products formed. Presumably, acids are formed from the breakdown of glycogen known to be distributed throughout the oyster. It is not known whether this breakdown is due to bacterial action or to glycolytic enzymes within the oyster tissue.

The present study, conducted from February 1955 to February 1956, was directed toward the correlation of pH and organoleptic changes in the Southern oyster (Crassostrea virginica) under various storage conditions and investigation of the mechanism involved in souring as a basis for appropriate control measures.

Experimental. --Shucked oysters were stored in pint metal friction-top cans at 41° and 75° F. The pH, odor, and appearance were determined at intervals. During refrigerated storage, the pH decreased gradually and continuously as the oysters and surrounding free liquor became less fresh in odor and appearance. The odor was noted to pass from fresh to stale, then to musty. As the pH decreased, the off-odor became progressively more sour and finally became very sharply sour. By this time the oysters were less firm and had taken on a darkened muddy color. The surrounding free liquor was turbid with many gas bubbles rising to the surface.

(over)

ABSTRACTER: Kathryn L. Osterhaug

7.89 DEVELOPMENT OF A SCALE FOR GRADING TOUGHNESS-TENDERNESS IN BEEF

Raffensperger, Elsie L.; Peryam, David R.; and Wood, Kenneth R. (Quartermaster Food and Container Institute for the Armed Forces, Chicago 9, Illinois)
Food Technology 10, 627-630 (December 1956)

Very little has been published on the logical development of sensory rating scale formats. This is particularly true in regard to rating scales for texture. Workers in the U. S. Department of Agriculture and the American Meat Institute Foundation and others have found several versions of a bipolar toughness-tenderness scale to work with some degree of success.

The work described here involved constructing a toughness-tenderness scale "from scratch". The first problem was to develop a scale in which every point is psychologically between its neighbors. A structured scale (one in which every point is labeled) was chosen as the objective since work by other investigators indicated that this tended to increase reliability.

Developing the scale. --The authors used a psychological scaling procedure in which stimuli are classified into successive intervals according to the degree of some defined attribute which they are judged to possess. Using verbal stimuli, the authors obtained responses from 150 subjects. Figure 1 shows examples of the items and the three different schedules that were used. Schedule 1 is bipolar, running from "greatest toughness" to "greatest tenderness", whereas each of the other schedules specifies only one aspect, either "toughness" or "tenderness". Subjects designated the meaning of each word or phrase by placing an "X" in the space judged most appropriate. To assure that the scale would be understood by the different types of subjects who might use it, people representing a wide range of experience in taste testing were included among the 150 subjects.

Selection of descriptions for the 9 intervals of the scale was carried out as follows: the modal scale value for each phrase that showed a normal distribution of responses was plotted against its

(over)

ABSTRACTER: Kathryn L. Osterhaug

9.7 EIGHT-WEEK FISHERIES COURSE STRESSES NAVIGATION

Anonymous
Western Fisheries 53, 16 (December 1956)

A special commercial fishing course offered by the University of British Columbia Youth Training School will extend from January 7 to March 1, 1957. Approximately 35 young people ranging in age from 16 to 30 years will study navigation and conservation as well as fishing gear maintenance, gas and diesel engine mechanics, fish handling, and boat building.

The course costs the students only 35 dollars, including eight weeks room, board, and tuition. Designed for young commercial fishermen, the school is organized to develop leadership. It is sponsored jointly by the federal Department of Labor and the provincial Department of Education.

A more advanced course for commercial fishermen, the two week, "Short Course", sponsored by the university and the federal Fisheries Department, is given in March. Instruction is given by members of the federal and provincial governments, the university staff, farm and fisheries organizations, and private agencies.

ABSTRACTER: Kathryn L. Osterhaug

7.89

standard deviation. The item nearest the midpoint of a given interval and which also had a low standard deviation was then chosen to represent that interval. It was found that results from the three schedules did not differ markedly. Because of its logical advantages, the bipolar schedule was chosen for use in this study.

The following 8-point scale was adopted in preference to the original 9-point scale because it gave a lower percentage of systematic error:

Extremely tough	Very tough	Moderately tough	Slightly tough	Slightly tender	Moderately tender	Very tender	Extremely tender

Schedule 1:
Very much lacks tenderness
Not chewable
Extremely tender
Neither tough nor tender

Greatest Toughness — Greatest Tenderness

Schedule 2:
Very much lacks tenderness
Not chewable
Extremely tender
Neither tough nor tender

No Tenderness — Greatest Tenderness

Schedule 3:
Very much lacks tenderness
Not chewable
Extremely tender
Neither tough nor tender

No Toughness — Greatest Toughness

Fig. 1. Three different schedules used in the word meaning test.

9.7

7.81 (Cross Reference: 7.82)

opening screw pinchcock Z to place the system under vacuum. As distillation begins, the temperature in the mouth of the first condenser rises rapidly on thermometer J; and as distillation continues, the temperature slowly declines. When the distillation temperature reaches a constant temperature of 3° or 4° C. above room temperature, distillation is complete. Pinchcock Z is closed, 20 ml. of distilled water are flashed into the apparatus through funnel H and tube G located in the side neck of the claisen-type tube, and the vacuum is released. Receiving vessel L is now disconnected, removed from the apparatus, and the liquid in vessel L is titrated with standard acid. Total elapsed time for a volatile base determination is about 5 minutes.

Results. -- Halibut flesh that contained, respectively, 17.2 and 11.5 milligram (mg.) percent volatile basic-nitrogen and to which was added, respectively, 31.4 and 152 mg. percent ammonia-nitrogen assayed, respectively, 99.7 and 106 percent recovery of added ammonia-nitrogen.

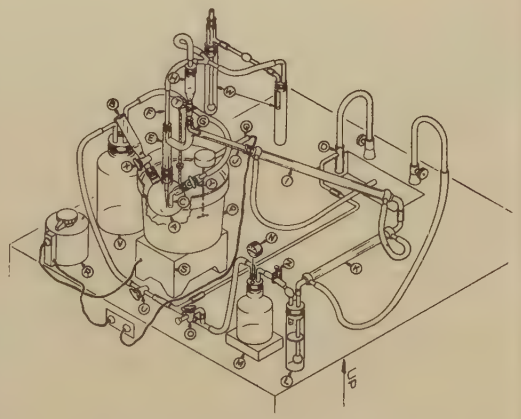

Fig. 2. Isometric drawing of the vacuum distillation apparatus. Descriptive lettering is explained in the text.

8.8 (Cross Reference: 1.81)

Holding the oysters at room temperature (75° F.) greatly accelerated the drop in pH as well as the other changes as noted in the refrigerated oysters. An interesting observation was that shucked oysters stored at 41° F. in glass beakers or in metal cans with loose-fitting aluminum foil covers developed very little sour odor although the pH fell at the same rate as those samples in containers with tight-fitting covers.

A seasonal variation in pH, initially and at intervals during subsequent storage at 41° F. was observed. The values were lowest during the summer and highest during the winter. The results of these tests is shown graphically in figures 2 and 3.

This report covers work performed under contract with the Fish and Wildlife Service.

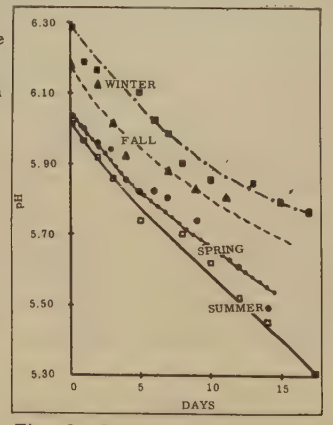

Fig. 2. Seasonal variations in pH of shucked oysters stored at 41° F. (5° C.) for 15 days.

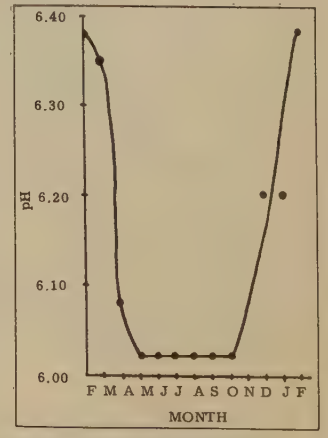

Fig. 3. Initial pH of shucked oysters by months.

0.2 PHYSICAL CONSTANTS OF FISH MUSCLE

Anonymous
Report of the Food Investigation Board (Great Britain) for 1954, pp. 43-44 (1955)

An adiabatic calorimeter in which thermal equilibrium in the muscle sample can be maintained throughout the complete range of heating was used to determine the heat capacity of cod muscle in the range -94° to 32° F. The apparent specific heat was determined from the heat capacity-temperature curve and found to be larger than unity over most of the range -94° to 32° F. and largest in the critical temperature range 32° to 23° F.

0.2 STUDIES ON PHYSICO-CHEMICAL PROPERTIES OF MARINE PRODUCTS AND RELATED SUBSTANCES

Kishimoto, Akira; Mitsuhashi, Kaoru; and Fujita, Hiroshi
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 5, 289-315 (1956) (In English)

I. Swelling and elastic behavior of thermally contracted dried cuttle-fish.
II. Analysis of elastic behavior of thermally contracted dried cuttle-fish.
III. Stress relaxation in dried cuttle-fish in liquid media.
IV. Application of Rivlin's method to the rupture of Kamaboko.
V. Heat conductivity of fresh fish meats.
VI. Rigidities of agar hydrogels.

1.92 COLD-STORAGE LIFE OF FRESH-WATER FISH - NO. 2 (YELLOW PERCH, CRAPPIE, WHITE BASS, UTAH CHUB, AND SQUAWFISH)

Osterhaug, Kathryn L. and Miyauchi, David T.
Commercial Fisheries Review 17, 19-21 (November 1955)

(Abstract of this article appears under 3.249 page 13 - January 1957)

1.92 COMPOSITION OF FRESH-WATER FISH: No. 1

Karrick, Neva, Clegg, William; and Stansby, Maurice E.
Commercial Fisheries Review 18, 13-16 (February 1956)

(Abstract of this article appear 8.0 page 17 - November 1956)

1.92 SHEEFISH OR INCONNU

Anonymous
Commercial Fisheries Review 18, 63-64 (September 1956)

1.95 OIL FROM THE MEAT AND MILK FAT OF SPERM WHALE (PHYSETER CATODON)

Pedersen, Torbjorn
Norsk Hvalfangst-Tidende 41, No. 6, 296-298, 300 (1952)

(Abstract of this article appears under 1.95 page 3 - January 1957)

1.95 CONTROL OF POST-MORTEM BACTERIAL SPOILAGE OF WHALES WITH CHLORTETRACYCLINE

Crean, P. B.; Tarr, H. L. A.; and Barker, R. B. (Technological Station, Vancouver, B.C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 105, 6-10 (February 1956)

(Abstract of this article appears under 2.01 page 3 - December 1956)

1.95 WASTE LIQUOR OF A WHALE FACTORY SHIP

Okura, Shunichi (Nippon Suisan Co., Tokyo)
Repts. Research Lab. Nippon Suisan Co., 7, 39-42 (1956)
Chemical Abstracts 50, 9040 (June 25, 1956)

2.118 THE PROBLEM OF FREEZING FISH AT SEA

Kuprianoff, J.
Kaltetech 8, 114-121 (1956)
Food Science Abstract 28, 460 (October 1956)

Economic aspects of the problem, concerning the quality of the fish when landed, current interest in fish frozen at sea, and operational experience gained by British, German, and Soviet freezing trawlers, are surveyed. The form in which fish is frozen has an essential bearing on the choice of freezing procedure and on the type of refrigeration plant.

2.118 PROPOSALS FOR A BRITISH STERN TRAWLING FISH FACTORY

Anonymous
World Fishing 6, 46-48 (January 1957)

2.118 NORTH ATLANTIC SHRIMP KEEPING QUALITY IN COLD STORAGE

Anonymous
Commercial Fisheries Review 18, 20 (November 1956)

Gulf of Maine or Northern shrimp were found to have good keeping quality when brine-frozen on board ship and then thawed, processed, packaged, refrozen and stored at 0° F. ashore.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner and Freezer
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feed Bag (supersedes Flour and Feed)
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

2.3 FOOD YIELDS SUMMARIZED BY DIFFERENT STAGES OF PREPARATION

Pecot, Rebecca K.; and Watt, Bernice K. (Household Economics Research Branch, Agricultural Research Service)
Agricultural Handbook No. 102, 93 pp. (June 1956) (Agricultural Research Service, United States Department of Agriculture)

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., price 50 cents.

Data on the yield after preparation and the loss or gain in preparation is given for approximately 65 species of fish and shellfish.

2.3 COMMERCIAL FISHERIES OF THE PRAIRIES

Butler, G. E.
Canadian Fisherman 43, 6, 8, 10 (August 1956)

(Abstract of this article appears under 1.92 page 3 - January 1957)

2.3 LARGE-FISH DRESSING AUTOMATED BY NEW RUSSIAN MACHINE

Lewin, David N. (Lewin Associates, New York City)
Food Engineering 28, 53, 218 (October 1956)

2.9 STUDIES ON THE FOOD POISONING ASSOCIATED WITH PUTREFACTION OF MARINE PRODUCTS

Kawabata, Toshihary; Ishizaka, Kimishige; and Miura, Toshiyuki
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 11, 1167-1180 (1956) (English abstracts, tables, and figures)

IV. Epidemiology and the causative agents of the outbreaks of allergy-like food poisoning caused by cooked Frigate-mackerel meat at Kawasaki and by "Samma Sakuraboshi" at Hamamatsu.

V. Influence of trimethylamine and trimethylamine oxide added to histamine or "Saurine" upon their own action tested on the contractility of intestine and uterus of guinea pigs.

2.9 SOME DEATHS DUE TO FISH POISONING (ICHTHYOSARCOTOXISM) IN INDIA

Jones, S.
Indian J. med. Res. 44, 353-360 (1956)
Food Science Abstracts 28, 570 (December 1956)

Details are given of 3 cases of poisoning (2 fatal) caused by eating cooked roes of the gangetic blowfish (Chelonondon patoca); these are the first deaths from fish poisoning investigated in India. The tetraodontids are the most virulently poisonous of the various groups of poisonous fish found in tropical seas, and include, in addition to various types of blowfish, puffer-fish and toad-fish. A summary is given of present information about tetraodontoxin, the toxic symptoms caused by it, and the treatment recommended for persons affected.

3.0 FOOD PRESERVATION AND PRESERVATIVES

Anonymous
Catalog of Technical Reports No. 190, 4 pp. (April 1954) (Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.)

3.0 RESEARCH ON FISH PRESERVATION AND PROCESSING

Tarr, H. L. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Food Manufacture 31, 239-243 (June 1956)

A review of station activities.

3.12 EFFECTIVENESS OF CHLORTETRACYCLINE, (AUREOMYCIN) ON KEEPING QUALITY OF PACIFIC ROUND HERRING, ETRUMEUS MICROPUS

Tomiyama, Tetuo; Kuroki, Shunichi; Maeda, Denki; Hamada, Moriji; and Honda, Akira
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 2, 120-127 (1956) (English synopsis, figures, and tables)

3.12 STUDIES ON THE ANTIBIOTIC ACTION OF FISH COMPONENTS

Toyomizu, Masamichi
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 6, 368-373 (1956) (In English)

IX. The relation between the antibiotic action of the autoxidized shark liver oil and thiobarbituric acid value.

3.12 ANTIBIOTICS IN FOOD PRESERVATION. II. STUDIES ON THE INFLUENCE OF SUBTILIN AND NISIN ON THE THERMAL RESISTANCE OF FOOD SPOILAGE BACTERIA

O'Brien, R. T.; Titus, Dudley S.; Devlin, K. A.; and Stumbo, C. R. (Laboratory of Food Microbiology, State College of Washington, Pullman, Washington); and Lewis, J. C. (Western Utilization Research Branch, U. S. Department of Agriculture, Albany, California)
Food Technology 10, 352-355 (August 1956)

Spores of various food spoilage bacteria appear to be appreciably less heat resistant when heated in the presence of subtilin or nisin.

3.12 PRESERVING PEELED SHRIMP

Toulmin, Harry A., Jr. (Commonwealth Engineering Co. of Ohio)
U. S. 2,758,930 (August 14, 1956)
Chemical Abstracts 50, 17521 (November 25, 1956)

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British fishery research (1955)	3	3.0
Aureomycin for bottom fish	5	3.12
Acids as food preservatives	7	3.12
Salt water ice	7	3.12
Antiseptic ice	7	3.17
Dips for iced shrimp	9	3.12
Chemical ices for shrimp	9	3.12
Antibiotics for dressed fowl	9	3.12
Irradiated meat pigments	11	3.19
Pacific Fisheries Experimental Station	27	3.0
Food preservation bibliography	27	3.0
Shrimp preservatives	27	3.12
Aureomycin for fresh herring	27	3.12
Antibiotic shark liver oil	27	3.12
Antibiotics for resistant spores	27	3.12
Salt fish		
Curing herring	17	3.5
Salt removal from whale meat	29	3.5
Study of halophilic bacteria	29	3.5
Sheefish		
Sheefish or Inconnu	25	1.92
Spoilage		
Pink yeast from oysters	1	0.5
Spoilage in oysters	1	2.00
Vitamins, vitamin A, chemistry		
Neo-b isomer of vitamin A	29	5.111
Coenzyme A	29	5.111
Whales and other marine mammals		
Waste liquor from whale factoryship	25	1.95

3.238 STICKS THAT DON'T STICK

Anonymous
Modern Packaging 50, 190-191 (March 1956)

(Abstract of this article appears under 3.237 page 9 - August 1956)

3.238 REDUCTION OF DEHYDRATION IN FROZEN FISH-FILLET BLOCKS TECHNICAL NOTE NO. 33

Holston, J. A.
Commercial Fisheries Review 18, 14-15 (June 1956)

(Abstract of this article appears under 3.237 page 13 - February 1957)

3.238 REFRIGERATION OF FISH - PART 3. FACTORS TO BE CONSIDERED IN THE FREEZING AND COLD STORAGE OF FISHERY PRODUCTS

Stansby, M. E.; Pottinger, S. R.; and Miyauchi, D.
Fishery Leaflet 429, 65 pp. (January 1956) Fish and Wildlife Service, U. S. Department of the Interior

(Abstract of this article appears under 3.249 page 9 - November 1956)

3.5 MOISTURE DETERMINATION OF SALT FISH

Hennessey, J. P. (Fish Inspection Laboratory, St. John's, Newfoundland)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations No. 62, 3 (July 1955)

(Abstract of this article appears under 7.43 page 17 - November 1956)

3.5 (Cross Reference: 0.5)

STUDY OF RED HALOPHILIC BACTERIA IN SOLAR SALT AND SALTED FISH: I. EFFECT OF BACTO-OXGALL II. BACTO-OXGALL AS A SELECTIVE AGENT FOR DIFFERENTIATION

Dussalt, H. P. (Technological Station, Grande River, Gaspe County, Quebec)
Journal of the Fisheries Research Board of Canada 13, 183-194, 195-199 (March 1956)

3.5 THE REMOVAL OF SALT FROM SALTED WHALE MEAT

Ando, Kazuo and Noda, Buntaro
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 3, 195-197 (1956)

Salt was removed from salted whale meat (Sunoko-meat) by soaking in running water at various temperatures at an outflow velocity of 570 cubic centimeters per minute. The water content of the meat increased at 25° C. and at 35° C. and decreased after a period of time at 45° C. and at 55° C.

5.111 CHEMICAL ASPECTS OF COENZYME A.

Baddiley, J. and Thain, E. M. (Lister Inst. Preventive Med., London)
Resumes communs., 2 Congr., Paris 230-1 (1952)
Chemical Abstracts 50, 10839 (August 10, 1956)

The proposed structure for coenzyme A (cf. C.A. 47, 4402f) was confirmed. Prolonged alk. hydrolysis gave pantothenic acid 4'-phosphate, but shorter hydrolysis gave cyclic pantothenic acid 2', 4'-diphosphate (I) and 4'-phosphate (II). Like synthetic I, natural I was converted to II on treating with alkali. Cyclic phosphate (III) presumably results from intramol. phosphorylation. Acid hydrolysis of coenzyme A produced pantothenic acid 4'-phosphate and not 2' or III. Since III is rather stable in acid, the pyrophosphate linkage in coenzyme A involves the 4' position in the pantothenic acid residue.

5.111 THE NEO-b ISOMER OF VITAMIN A AND RETINENE

Brown, Paul K. and Wald, George (Biological Laboratories, Harvard University, Cambridge, Massachusetts)
The Journal of Biological Chemistry 222, 865-877 (October 1956)

The neo-b (11-cis) isomer of vitamin A and retinene, the precursor of rhodopsin and iodopsin, is a hindered cis polyene, the first such structure to appear in nature. It is stored almost exclusively in the eyes of certain crustaceae. Its preparation and properties are described, particularly properties useful in its identification and measurement in mixtures and tissue extracts: reduction of the retinene to vitamin A with potassium borohydride, isomerization with iodine and light, the antimony chloride reaction, and the synthesis of rhodopsin.

6.193 STUDIES ON UTILIZATION OF WASTES IN PROCESSING SHELLFISH

Koyanagi, Takeo; Uchida, Shogoro; Kato, Gero; and Tanaka, Sasaku
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 6, 1181-1184 (1955) (English abstract and tables)

IV. The effect of viscera-extract of Pecten laqueatus on chick growth.

8.7 A NOTE ON HUMPBACK (WHALE) OIL AND ON THE MILK AND MILK FAT FROM THIS SPECIES (MEGAPTERA NODOSA)

Pedersen, Torbjorn
Norsk Hvalfangst-Tidende 41, No. 7, 375-378 (1952)

(Abstract of this article appears under 1.95 page 5 - January 1957)

9.17 UTILIZATION OF SEA LIONS IN ALASKA

Dassow, John A.
Commercial Fisheries Review 18, 5-9 (January 1956)

(Abstract of this article appears under 1.95 page 3 - November 1956)

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